

**EXHIBIT 14**  
**[FILED UNDER SEAL]**

**HIGHLY CONFIDENTIAL**

**UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF TEXAS**

STATE OF TEXAS et al.,  
Plaintiffs

vs.

GOOGLE LLC,  
Defendant

Case Number 4:20-cv-00957

**CORRECTED EXPERT REBUTTAL REPORT OF DAVID W. DERAMUS, PH.D.**

**September 9, 2024 – Incorporating October 25, 2024, Errata**

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## I. Introduction

### I.A. Qualifications and experience

- (1) My name is David W. DeRamus. My business address is 2001 K St., NW, North Building, Suite 500, Washington, DC, 20006. I am a Partner with the economic consulting firm of Bates White, LLC. I have been in this position since 1999. During this time period, I have served as a testifying and consulting economic expert on a wide range of litigation and non-litigation matters, including matters related to antitrust, class certification, mergers and acquisitions, market manipulation, intellectual property disputes, international trade, tax and transfer pricing, contract disputes, investment disputes, other commercial litigation and arbitration matters, and a variety of proceedings related to the energy industry. Much of my work on litigation matters has involved estimating damages; valuing companies or assets (including technology); and various other financial analyses. From 1998 to 1999, I was employed by the management consulting firm of A.T. Kearney. From 1993 to 1998, I was employed by the accounting firm of KPMG Peat Marwick. In both firms, I performed a variety of economic and statistical analyses related to litigation and non-litigation matters. I received a Ph.D. in Economics from the University of Massachusetts at Amherst, with a specialization in Industrial Organization and International Economics. My Curriculum Vitae is attached as Appendix A. Bates White is being compensated for my time on this matter at the rate of \$1250 per hour. This compensation is not contingent on the outcome of the case.

### I.B. Scope of charge

- (2) I was retained on August 14, 2024, by the Lanier Law Firm. I signed the protective order on that same day. I was asked by counsel for the State of Texas and other Plaintiff States to evaluate and respond to the reports of Dr. Steven Wiggins and Dr. Douglas Skinner, filed on behalf of Google, LLC ("Google" or "Defendant").<sup>1</sup> In particular, I have been asked to respond to their arguments regarding, and quantification of, the relevant scope and extent of Google's conduct at issue; the appropriate financial metrics that should be applied in evaluating that conduct; and the appropriate penalty amounts, if any, that should be applied to Google, in the event that the jury finds that it has engaged in the conduct alleged in the complaint and that the alleged conduct constitutes a violation of the relevant statutes. In responding to Dr. Wiggins and Dr. Skinner, I was asked to focus my analysis on the amount of the monetary penalty, both on a per violation and aggregate basis, that would be

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<sup>1</sup> Expert Report of Douglas Skinner, July 30, 2024 [hereinafter "Skinner Report"] and Expert Report of Steven N. Wiggins, July 30, 2024 [hereinafter "Wiggins Report"].

necessary to deter the conduct at issue, either by Google or by another party in the future. It is my understanding that deterrence is one of the factors that the jury should consider in assessing the appropriate penalty amount under the relevant statutes of the Plaintiff States, such as the Texas Deceptive Trade Practices Act (“DTPA”).<sup>2</sup>

- (3) The primary focus of my response to Dr. Wiggins and Dr. Skinner is on the appropriate penalty amounts if the jury finds that Google engaged in unfair, false, deceptive, and misleading business practices related to its display advertising technology products (“Ad Tech products”) and the changes it made to the auctions for display ads from at least 2013 to the present, as alleged by the Plaintiff States. It is also my understanding that the Plaintiff States allege other causes of action, including violations of the federal antitrust laws and similar state statutes related to unfair competition. While I take into consideration issues related to Google’s market power and the impact of its conduct on competitors, my opinion on the appropriate penalty amount necessary for deterrence is not dependent on a jury finding of liability for the Plaintiff States’ antitrust claims.
- (4) In performing my analysis, I have relied on a wide range of information, including the information in the cited expert reports, other documents and data produced in discovery, deposition testimony, and publicly or commercially available research. The materials on which I rely are listed in Appendix B. I reserve the right to supplement in the event of the production of additional data or additional expert testimony from Google. I also reserve the right to use graphics, figures, and/or illustrations at trial to depict conclusions. I further reserve the right to supplement with additional bases for my opinions.

## I.C. Summary of opinions

- (5) In formulating my responses to Dr. Wiggins and Dr. Skinner, I assume that the jury finds Google to have engaged in the alleged deceptive conduct at issue, and that it finds such deceptive conduct to constitute violations of the relevant statutes of the Plaintiff States. Given this assumption, my analysis is focused on estimating the amount of the monetary penalty, consistent with statutory guidelines, that would be sufficient to deter the conduct at issue. I understand that the ultimate

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<sup>2</sup> See, e.g., Texas Deceptive Trade Practices Act, accessed May 29, 2024, <https://statutes.capitol.texas.gov/Docs/BC/htm/BC.17.htm>, Sec. 17.47(g)(3) (“In determining the amount of penalty imposed under Subsection (c), the trier of fact shall consider [...] the amount necessary to deter future violations.” Additional factors cited in Sec. 17.47(g) are discussed below) ; see also Utah Consumer Sales Practices Act, Sec. 13-11-17 (factors considered in assessing appropriate civil penalties include “the need to deter the supplier or other suppliers from committing the violation in the future”); *State ex rel. Wilson v. Ortho-McNeil-Janssen Pharm., Inc.*, 777 S.E.2d 176, 203 (S.C. 2015) (case law providing factors including “the deterrence value of the assessed penalties”). See Section II.A for further discussion of the Plaintiff States DTPAs.



determination of the penalty amount is an issue for the jury, and that the jury may consider a range of other factors in that determination. In summary, I conclude as follows:

- (6) Dr. Wiggins suggests a range of total penalty amounts of between \$22 million and \$141 million,<sup>3</sup> although he ultimately concludes that the appropriate penalty is zero.<sup>4</sup> These amounts are inconsistent with the scope of the conduct at issue (see Section III); do not reflect the types of harm caused by the conduct at issue (see Section III.D); do not reflect the benefits obtained by Google from the conduct at issue (see Section IV); do not reflect the extent of the conduct at issue (see Section V); and are insufficient to deter Google, or other parties, from engaging in similar conduct in the future (see Section VI). Dr. Wiggins comes to his conclusion by: (i.) focusing narrowly on a subset of the Google products affected by the conduct at issue; (ii.) assuming, without any empirical basis, that sophisticated publishers and advertisers would have been able to avoid much, if not all, of the harm that otherwise would have resulted from the conduct at issue; (iii.) ignoring the broader harm caused by the conduct, including harm to publishers, advertisers, competitors, the competitive process, and consumers; (iv.) narrowly focusing on only a relatively small portion of the benefits obtained by Google from the conduct and ignoring other Google documents showing substantially higher benefits; and (v.) inappropriately reducing the number of affected transactions and statutory violations to 579 billion<sup>5</sup> (which, nevertheless, still constitutes an exceedingly high number of violations).
- (7) Dr. Wiggins's analysis does not assess whether the range of penalty amounts he proposes is sufficient to deter Google from engaging in similar conduct in the future. Given the exceptionally large profits generated by Google over the conduct period, the expected continuation of these profits for the foreseeable future, and the broad scope of commerce affected by the conduct, it is unreasonable to expect Dr. Wiggins's proposed penalty amounts to have any deterrent effect on Google, or other similarly situated companies. Similar fines, and even considerably larger fines, imposed on Google in the past have not deterred Google from engaging in this or similar conduct in its other product areas (see Section VII). Dr. Skinner similarly errs in his analysis of the revenues and profits of Google's businesses affected by the conduct at issue; and in his critique of Mr. Andrien's analysis of the impact of a potential \$29 billion monetary penalty on Google's financial condition and operations (see Section VIII).<sup>6</sup>
- (8) Dr. Wiggins's conclusions are predicated on his overly narrow focus on the amount of operating profits Google earned in a subset of the Plaintiff States from the conduct at issue.<sup>7</sup> Dr. Wiggins

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<sup>3</sup> Wiggins Report, Figure 6.

<sup>4</sup> Wiggins Report, ¶ 19.

<sup>5</sup> Wiggins Report, Figure 1.

<sup>6</sup> Skinner Report, ¶¶ 59, 65.

<sup>7</sup> Wiggins Report, ¶¶ 16, 116.

ignores the fact that under many of the relevant Plaintiff States' statutes at issue, the Plaintiff States are entitled not only to a disgorgement of Google's profits from the alleged conduct, or to a recovery of the damages caused by that conduct, but also to statutory penalties based on the number of violations. It is my understanding that states often adopt statutory penalties when harm from certain conduct is real, but difficult to quantify. The relevant statutes specify a range of potential per-violation penalty amounts, with maximum penalty amounts typically well above \$1,000 per violation. For example, the Texas, Arkansas, Florida, Mississippi, and Montana DTPAs specify a maximum of \$10,000 per violation.<sup>8</sup> Thus, applying Dr. Wiggins's estimate of 579 billion violations by \$1,000 (the lower end of the maxima specified in the relevant Plaintiff States' statutes) would still result in a penalty of \$579 trillion, i.e., a sum far in excess of U.S. GDP and sufficient to easily bankrupt Google. None of the relevant Plaintiff States' statutes limit the determination of the penalty amount to a disgorgement of profits, as Dr. Wiggins assumes in his calculations. On the contrary, those statutes that specify the factors that are to be considered in setting the appropriate per-violation penalty amount include a range of factors that Dr. Wiggins either does not consider adequately, such as the scope and severity of the conduct, or at all, such as deterrence.

- (9) "The amount necessary to deter future violations" is one of the factors that the Texas DTPA, and similar statutes and case law providing guidance in the other Plaintiff States, specify for determining the appropriate per violation penalty amount; and this factor is the primary focus of my responses to Dr. Wiggins and Dr. Skinner (see Section VI). From an economic perspective, for a monetary penalty to constitute adequate deterrence, at a minimum, the amount must take into account not only the expected total (i.e., global) long-term benefits of the conduct to Google; but also the *ex ante* probability of detection and enforcement. Thus, the minimum deterrent amount will generally be many multiples of the expected total benefits of the conduct.
- (10) This conclusion regarding deterrence – that one needs to consider the probability of detection and enforcement, as well as the amount of both total benefits and harms – is extensively supported by the economic literature (see Section II.B). In their reports, neither Dr. Wiggins nor Dr. Skinner considers the probability of detection and enforcement, the expected total benefits to Google of the conduct, or the broader harm of the conduct. In this instance, an even larger penalty amount may be optimal from a deterrence perspective than simply incorporating the probability of enforcement and detection, given the substantial cost of enforcement; the limited resources of relevant enforcement agencies (such as the Plaintiff States' Attorneys General); the exceptionally high profitability and large financial resources of Google; and the extent and severity of the conduct at issue, including the harm of the conduct to publishers, advertisers, the competitive process, and ultimately consumers.

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<sup>8</sup> Expert Report of Jeffrey S. Andrien, June 7, 2024 [hereinafter "Andrien Report"], Table 3.

- (11) Additional support for a large deterrent penalty amount, relative to the total expected or actual benefits obtained by Google, is found in the extensive “principal-agent” economic literature (see Section II.C). The economic literature has long recognized that there can be divergent incentives between a company’s “principals,” i.e., its shareholders, and their “agents,” i.e., the managers charged with acting on the shareholders’ behalf to maximize the value of the company. Dr. Wiggins and Dr. Skinner fail to account for this factor when coming to their conclusions regarding the appropriate penalty and the potential impact of a penalty on Google’s stock price. In this case, the conduct at issue was developed and implemented by Google’s management; but the penalty amount will most likely be borne disproportionately (if not entirely) by current shareholders. For conduct of the type and scope at issue here, in order for a penalty amount to significantly deter management’s actionable conduct, the penalty needs to be sufficiently large to affect the company’s stock price, so that shareholders, in turn, have the incentive to direct a change in management’s conduct. Absent that sufficiently strong market “signal,” shareholders have little or no incentive to change management’s conduct, as the benefits that they can expect to gain from that conduct are likely to continue to be greater than their costs. Thus, all else equal, the principal-agent literature suggests that for a given penalty amount to have a deterrent effect, it needs to be larger for a publicly owned company than a privately owned company; and it needs to be larger, the larger the company’s size, the larger the amount of its profits, the larger its market capitalization, and the faster its growth. If the penalty is not sufficiently large to be detectable by a company’s shareholders relative to the myriad of other factors that affect a company’s stock price, managers will have an incentive to engage in actionable conduct that increases the company’s short-term profits (insofar as those lead to increases in management’s compensation) without being disciplined by shareholders if and when penalties are imposed for that behavior in later years.
- (12) To determine the amount necessary for deterrence, given the exceptionally large number of violations at issue, from an economic perspective the appropriate method for establishing the relevant per-violation penalty amount is to: *first*, establish the aggregate deterrent amount (“\$D”), based on a broader assessment of the overall scope, extent, total benefits, and total harms of the conduct, adjusted for the probability of detection and enforcement, as well as other factors, consistent with the well-established principles developed in the economic and finance literature on this topic; *second*, divide the aggregate deterrent amount by the number of statutory violations (“n”); and *third*, select the minimum of either: (a.) the maximum per penalty amount (i.e., \$10,000 in the case of the Texas DTPA); or (b.) \$D/n. Thus, if Google committed 579 billion statutory violations, as Dr. Wiggins calculates, and the aggregate deterrent amount is between \$7.3 billion and \$21.8 billion (using a range provided by Mr. Andrien),<sup>9</sup> the appropriate per penalty amount is \$0.013 - \$0.038 per violation; which is still far below the statutory maximum penalties per violation, but far above the amount assumed by Dr. Wiggins. From an economic perspective, this implies that once

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<sup>9</sup> Andrien Report, ¶ 11, point h.

the number of statutory violations grows to a very large number, the overall violation count becomes less relevant in determining the appropriate aggregate penalty amount, given the large maximum per penalty amounts available under the statutes (see Section II.B). Given the scale of Google's conduct, whether the relevant number of statutory violations is 579 billion, as Dr. Wiggins concludes, or many trillions, as Mr. Andrien concludes, does not change the aggregate penalty required to deter the conduct.

- (13) To address Dr. Wiggins's failure to account for deterrence in deriving an appropriate penalty amount, I apply the framework from the relevant economic and finance literature to the facts of this case. The first factor I analyze is the scope and severity of the harm likely caused by the conduct at issue, placing the conduct within the specific context of the products and structure of the Ad Tech industry (see Section III). While severity is listed as a separate factor to be considered in some of the Plaintiff States' statutes, from an economic perspective, the overall scope and severity of the conduct at issue – i.e., the type of impact that it had on publishers, advertisers, Google, Google's competitors (in each of the relevant product markets), and ultimately, consumers – is also relevant in assessing the appropriate aggregate deterrent amount. This is because the scope and severity of the conduct are likely to reflect the broader harm of the associated conduct, as well as its potential benefits to Google.<sup>10</sup> Based on my review of the information in this case, I conclude that the actual and potential total benefits to Google go well beyond the limited incremental profits that Dr. Wiggins calculates; and that the total long-term harm to publishers, advertisers, competition, and ultimately consumers is likely well in excess of Google's total benefits to date. I further conclude that the scope of the conduct at issue likely affected a broader range of Google's products than Dr. Wiggins assumes in his analysis, including Google's in-app products; Google's other Ad Tech products that are integrated into, and interdependent with, Google's display advertising "ecosystem;" and potentially including advertising on Google's own properties (e.g., YouTube, Gmail, or Search) via its effect on AdWords, for example.
- (14) The second factor I consider is the total volume of commerce likely affected by the conduct at issue (see Section IV). Dr. Wiggins focuses his penalty analysis solely on his estimate of incremental profits, and solely on the transactions he allocates to the Plaintiff States. In contrast, to determine an appropriate deterrent penalty, I consider it important to assess the full extent of the conduct at issue—i.e., the total volume of commerce affected by that conduct. The volume of commerce affected can be measured by the amount of Google's booked revenues affected by the conduct,

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<sup>10</sup> For example, if Google were a small player selling a discrete and separable product in a very large market, and the conduct at issue allowed it to earn one additional penny on a small volume of sales, and that additional penny of sales came solely at the expense of publishers, for which it constituted an exceptionally small fraction of their revenue and profits, it is unlikely that the scope of benefits obtained by Google was in excess of that incremental penny; or that the harm to the publishers resulting from the conduct was greater than the amount of Google's benefit; or that the conduct would likely lead to additional long-term benefits to Google or long-term harm to others.

which provides one indication of the potential severity of the conduct, its potential amount of harm, and its range of potential benefits to Google. I also analyze the amount of Google's net revenue, gross profits, and operating profits that were likely affected by the conduct. In his analysis, Dr. Wiggins focuses narrowly on a subset of Google's Ad Tech products at issue.<sup>11</sup> In contrast, I review the revenues and profits for Google's total Ad Tech business, as reported in its Display & Video, Apps, and Analytics ("DVAA") financial schedules, as I expect the conduct affected all the products included in that business. In my assessment, I also consider the revenues and profits of Google's business segments, Google Network and Google Websites, as reported in the company 10-Ks. The amount of Google revenues and profits for these businesses are large (see Section IV). Total booked revenue for the period at issue is [REDACTED] for Google's Ad Tech (DVAA) business, i.e., for those products most clearly affected by the conduct; to the extent that the conduct also affected other Google Network revenues, the total affected booked revenues would increase to \$224 billion; and if the conduct affected advertising on Google's own properties, it would affect an additional \$1.15 trillion in booked revenues.<sup>12</sup> Corresponding total operating profits are [REDACTED] for Ad Tech (DVAA), [REDACTED] for Google Network, and approximately [REDACTED] for Google Websites.<sup>13</sup> While there are important conceptual issues associated with how the affected revenues and profits should be allocated to the Plaintiff States, I adopt Mr. Andrien's conservative approach.<sup>14</sup> Although it likely significantly understates the volume of commerce associated with the Plaintiff States, this allocation results in total booked revenue allocated to the Plaintiff States of [REDACTED] for DVAA, \$30.7 billion for Google Network, and \$159.0 billion for Google Websites during the period at issue; and total operating profits allocated to the Plaintiff States of [REDACTED] for DVAA, [REDACTED] for Google Network, and [REDACTED] for Google Websites.<sup>15</sup>

- (15) The third factor I evaluate is the extent of the conduct at issue as measured by the number of affected transactions (see Section V). Dr. Wiggins contends that the number of affected transactions in the Plaintiff States is 579 billion. Dr. Wiggins fails to distinguish between the number of total affected transactions ("N") and the number of potential statutory violations ("n"), both of which are relevant for determining appropriate deterrent penalties. The former ("N") is relevant in assessing the full scope, extent, potential harm, and potential benefits of the conduct; while the latter ("n") is used to derive per-penalty amounts (up to the relevant statutory maximum). I also disagree with several of Dr. Wiggins's "corrections" of Mr. Andrien's number of affected transactions, such as his "correction 2," which eliminates in-app transactions. It is my understanding that AdX is also used for in-app advertisements, and thus, these transactions would have been affected by the conduct at

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<sup>11</sup> Wiggins Report, ¶ 112.

<sup>12</sup> See Section IV.

<sup>13</sup> See Section IV.

<sup>14</sup> Andrien Report, ¶¶ 93–94.

<sup>15</sup> See Section IV.

issue. Based on the figures in Dr. Wiggins's report, I estimate the total number of affected transactions ("N") to be between 19 trillion and 98 trillion globally. With regard to the number of statutory violations ("n"), I estimate that the number of *transactions* subject to statutory penalties is likely between at least 739 billion and 3.6 trillion; while the number of potential statutory *violations* ("n") could be between 974 billion and 7.7 trillion, depending on whether the jury considers each of the programs as applied to each transaction to be separate violations; or if it limits the number of statutory violations to at most one per transaction. Even if one were to accept Dr. Wiggins's number of violations of 579 billion, however, the number is so large that it does not change the appropriate deterrent penalty amount, which should be derived first on an aggregate basis, and then converted to a per violation amount by simply dividing it by the number of statutory violations that the jury ultimately determines.

- (16) Contrary to Dr. Wiggins's unsupported conclusions that Google's conduct had a minimal, if any, impact on either Google or the Ad Tech industry participants,<sup>16</sup> my analysis of the scope of the conduct, the affected industry, the likely types of harm, the volume of commerce affected, the number of affected transactions, and the benefits to Google all strongly indicate that a penalty in this case would need to be quite large to have an appropriate deterrent effect. I then turn to estimate an appropriate deterrent penalty (see Section VI). To do so, I first review Dr. Wiggins's penalty estimates of between \$21.7 million and \$141.3 million based on his estimate of Google's incremental benefits (see Section VI.A). None of Dr. Wiggins's penalty amounts are derived using a method appropriate for determining a deterrent amount, as he fails to account for the probability of detection and enforcement; nor are they consistent with the benefits that Google expected to obtain, and did obtain from the conduct at issue, as reflected in multiple Google's contemporary documents. For example, in 2015, Google employees estimated that Project Bernanke allowed the company to earn [REDACTED] of incremental revenues on an annualized basis. Other Google documents estimate that its DRS and RPO programs each enabled it to earn an additional [REDACTED] in incremental revenues. Since these programs were expected to continue into the future, I perform my calculations using two alternative growth rates, applying 3 percent and 5 percent annual growth rates<sup>17</sup> to the incremental profits associated with the projected incremental revenues from these programs to derive the total *ex ante* expected value of their benefits to Google. I also review a range of data sources suggesting that reasonable estimates of the *ex ante* probability of detection, enforcement, and collection of penalties is between no more than 33 percent and 10 percent. Dividing the *ex ante* expected value of the benefits by these probabilities results in a range of deterrent penalties of between \$14.8 billion and \$124.4 billion as of June 2025;<sup>18</sup> or between \$10.7 billion and \$75.9 billion, assuming a 20-year limited duration of the expected benefits. The width of

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<sup>16</sup> Wiggins Report, Figure 6 and ¶ 19.

<sup>17</sup> These growth rates are considerably less than Google's prior or projected future growth rates at the time.

<sup>18</sup> June 2025 is the earliest date on which I assume Google would pay a penalty in this case.

these ranges largely reflects the use of probabilities of between 33 percent and 10 percent (i.e., expected benefit multipliers of between three and ten). I also derive deterrent penalties using an *ex post* approach by estimating Google's benefits during the years at issue, and scaling those benefits to its actual growth in Ad Tech revenues. Applying the same probabilities as in the *ex ante* approach results in deterrent penalties of between \$9.6 billion to \$43.7 billion. A reasonable fact finder could determine that the appropriate penalty is within these ranges or, potentially, even higher.

- (17) As discussed above, Dr. Wiggins and Dr. Skinner fail to address the role of principal-agent issues in determining a deterrent penalty. To address this omission and as an alternative method for deriving a deterrent penalty, I analyze prior financial market reactions to fines previously imposed on Google (see Section VII.A). For example, Google has previously been assessed fines or settlements more than 48 times, of which 18 were in the US, 18 in the EU — including fines of approximately \$9.5 billion in Europe during 2017 – 2019 for similar conduct — and 12 in other regions of the world. Despite this, the financial markets had little reaction to these fines (Section VII.B). For a penalty to be sufficiently large for shareholders to require a change in management conduct, i.e., in order for the penalty to have a deterrent effect on management's future conduct, it needs to be sufficiently large to be detectable by shareholders, relative to the myriad of other factors that cause daily fluctuations in the company's stock price. My econometric analysis of the impact of Google's prior fines on its stock price further confirms my conclusion that penalties in the magnitudes of those that have been assessed previously against Google have had little to no measurable impact on its stock price. Based on that analysis, I conclude that a penalty amount in this case of between \$12 and \$25 billion, and likely higher, is required to have a deterrent effect on Google's future conduct, as well as the conduct of potentially similarly situated companies, particularly given the profitability of the conduct at issue. These penalty amounts, and those I derive above, do not take into account other factors that the relevant statutes specify should be considered in the jury's ultimate determination.
- (18) Finally, I disagree with Dr. Skinner regarding the financial impact on Google (or its parent company, Alphabet) of a \$29 billion potential penalty evaluated by Mr. Andrien.<sup>19</sup> From my analysis, I conclude a deterrent penalty of \$50 billion is unlikely to cause Google financial difficulties, limit its ability to invest in research and development ("R&D"), make capital expenditures, engage in mergers and acquisitions, limit its access to capital, or otherwise interfere with Google's day-to-day operations (see Section VIII). Relevant Google financial measures as of the end of 2023 that I consider in coming to this conclusion include the following:
- Google had cash and short-term equivalents on hand of \$110.9 billion;
  - it generated \$101.7 billion in free cash flow from operations in 2023 alone;

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<sup>19</sup> Skinner Report, Section X.



- it had available credit lines of \$10 billion and very limited total debt (including long-term leases) of \$29.9 billion, indicating a substantial amount of available borrowing capacity well above \$50 billion;
- it had a market capitalization of about \$1.8 trillion (and over \$2 trillion currently); and
- over the past 9 years, it has spent \$240 billion in repurchasing its own shares (through 2023), with not yet executed stock buybacks after 2023 including the additional authorized buyback (since 2024) of \$106 billion.

(19) The remainder of my report is organized as follows. In response to Dr. Wiggins's and Dr. Skinner's opinions, in Section II, I first provide the economic framework to be used in determining an appropriate deterrent penalty amount. I then apply that framework to the relevant issues in this case. To do so, in Section III, I review the scope of the conduct at issue, including the various products and markets likely affected by the conduct; as well as the types of harm to society and benefits to Google that likely resulted from the conduct. In Section IV, I analyze the extent of the conduct at issue, focusing first on the volume of commerce, including Google's revenues and profits not only from its Ad Tech business, but also from its broader advertising business that may have been affected by the conduct. In Section V, I analyze the global number of advertising transactions likely affected by the conduct ("N") and the number of potential statutory violations ("n") in the relevant Plaintiff States. In Section VI, I review Dr. Wiggins's estimate of Google's incremental benefits from the conduct. Then, based on estimates of Google's incremental benefits derived directly from various Google documents, and applying a reasonable range of probabilities of detection and enforcement obtained from my research, I derive a range of deterrent penalty amounts, consistent with the guidance provided by the economic and finance literature. In Section VII, I derive an alternative estimate of deterrent penalties, using a methodology consistent with the guidance provided from the principal-agent literature, based on a statistical analysis of the financial market impact of prior penalties imposed on Google. Lastly, in Section VIII, I examine whether a deterrent penalty of \$50 billion is likely to result in "overdeterrence," by either significantly impairing Google's financial condition; limiting its ability to finance capital expenditures, R&D activities, or mergers and acquisitions; or otherwise impinging on its day-to-operations.

## **II. Economic framework for determining statutory penalties with a deterrent effect**

(20) Dr. Wiggins's framework for assessing the appropriate penalties for the conduct at issue fails to consider all the relevant economic considerations, particularly those relevant for determining an



appropriate deterrent penalty.<sup>20</sup> As I discuss in detail below, Dr. Wiggins omits a discussion of key factors in determining the economically appropriate magnitude of a penalty; he narrowly focuses on AdX rather than on all the products affected by the conduct; and he only considers as relevant those transactions that he narrowly determines are “linked to the alleged deception.”<sup>21</sup> The sections below address the flaws in Dr. Wiggins’s analysis. In this section, I discuss the economic considerations identified by the economic and finance literature that are relevant in determining appropriate penalties that would likely have the effect of deterring similar conduct in the future, whether by Google or by other parties. In subsequent sections, I discuss the scope of the alleged conduct, the types of harm that likely resulted from the alleged conduct, and the implication of that scope and harm for the relevant products affected by the alleged deception.

## II.A. Alternative approaches to determining monetary remedies

- (21) There are various approaches to determining monetary remedies in a litigation context, depending on the statute, the plaintiff, the defendants, and the claimed harm. One approach may be to calculate the benefits obtained by the defendant as a result of the conduct, such as in a plaintiff’s claim for the disgorgement of a defendant’s profits resulting from the infringement of the plaintiff’s patents. In other contexts, a plaintiff may seek recovery of their monetary damages. In a price-fixing case, for example, a plaintiff purchaser may have paid prices for a particular input that were elevated by the price-fixing agreement; thus, an appropriate measure of damages may be calculated by first estimating the price that the plaintiff would have paid “but for” the alleged conduct, and then calculating the plaintiff’s damages based on the amount of the price differential multiplied by the plaintiff’s volume of purchases. In yet other contexts, a plaintiff may seek to recover the profits that they would have earned, or the lost value of their business, as a result of the defendant’s conduct at issue, such as in the event of conduct that forced a plaintiff competitor to exit a relevant market and allowed the defendant to monopolize it. In yet other instances, such as in a contract-related dispute, a plaintiff may seek monetary relief based on the full rescission of the contract, with a complete repayment of all revenues paid by the plaintiff or monies received by the defendant.<sup>22</sup>
- (22) Note that a defendant’s benefit (e.g., the incremental profit earned by a chemical company from making a product) may not equal the harm to the plaintiff (e.g., the disruption to a purchaser’s business if a chemical was defective) or to other parties (e.g., the physical harm to consumers exposed to a toxic chemical spill). Certain statutes may also allow for the recovery of a multiple of

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<sup>20</sup> Wiggins Report, § III.B.

<sup>21</sup> Wiggins Report, ¶ 104.

<sup>22</sup> For a general review of alternative approaches for calculating monetary remedies, see, e.g., Roman Weil, Daniel Lentz, and David Hoffman (eds.), *Litigation Services Handbook: Role of the Financial Expert*, John Wiley & Sons, Inc., 2012, Fifth Ed.; Hoboken, NJ, pp. 4.11 – 4.21.

damages, such as treble damages in the case of certain antitrust violations, or punitive damages in other contexts.<sup>23</sup> It is my understanding that the purpose of treble damages in the antitrust context, and to a certain extent punitive damages, is to deter the conduct at issue, both with regard to the defendant and other parties.<sup>24</sup>

- (23) In response to Dr. Wiggins and Dr. Skinner, I have been asked to focus on the civil penalties sought by the Plaintiff States' claims based on certain Plaintiff State statutes, such as the Texas DTPA, which allow for the award of statutory penalty amounts for deceptive conduct. These statutory penalties are assessed on a per-violation basis, with the statutes often specifying a maximum penalty amount per violation, as in the Texas DTPA, which has a maximum of \$10,000 per penalty.<sup>25</sup> It is my understanding that civil penalties are often applied to statutory violations when the harm resulting from a given course of conduct is real, but difficult to quantify; or when the purpose of the statute is to punish the wrongdoer and/or to deter similar conduct in the future, rather than simply restore the status quo, as with the disgorgement of unlawful gains, which may be an insufficient remedy or deterrent for the unlawful conduct.<sup>26</sup> With civil penalties, the amount of the penalties can be calibrated to deter the wrongful conduct.<sup>27</sup>
- (24) While each statute with civil penalties may provide different levels of guidance with respect to how the amount of the penalty should be calculated (including, in some instances, no specific guidance), those that do specify which factors to apply often provide a relatively broad set of factors. For example, the Texas DTPA provides the following guidance for how an appropriate penalty amount should be determined:

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<sup>23</sup> See, e.g., Indiana Code § 24-5-0.5-4 (2023), which states that the court "may increase damages for a willful deceptive act in an amount that does not exceed the greater of: (1) three (3) times the actual damages of the consumer suffering the loss; or (2) one thousand dollars (\$1000)," in an action brought by "a person relying upon an uncured or incurable deceptive act;" Nevada Rev State § 598.0971 (2023), which permits the imposition of "an administrative fine of \$1,000 or treble the amount of restitution ordered, whichever is greater;" North Dakota Century Code § 51-15-09 (2023), which states that "if the court finds the defendant knowingly committed the conduct, the court may order that the person commencing the action recover up to three times the actual damages proven;" South Carolina Code § 39-5-50 (2023), which states that the court "shall award three times the actual damages sustained" in an action brought "individually" by "any person who suffers any ascertainable loss of money or property... as a result of the use... of an unfair or deceptive method;" and Texas Code § 17.50 (2023), which similarly provides for treble damages for "mental anguish." See also 15 U.S.C. § 15 (2023) and 18 U.S.C. (1964) for examples of federal laws allowing for treble damages.

<sup>24</sup> See, e.g., Steven C. Salop & Lawrence J. White, Economic Analysis of Private Antitrust Litigation, 74 GEO. L.J. 1001, 1051 (1986). The Supreme Court noted that the fear of treble damages creates "a crucial deterrent to potential violators." (*Mitsubishi Motors Corp. v. Soler Chrysler-Plymouth, Inc.*, 473 U.S. 614, 635).

<sup>25</sup> See Andrien Report, §§ III.E and IV.E, and his Table 3 for a summary of the maximum penalty per violation.

<sup>26</sup> Rohit Chopra and Samuel A. A. Levine, "The case for resurrecting the FTC Act's penalty offense authority." *University of Pennsylvania Law Review*, Vol. 170: 71, 2021, p. 81; § II.A; and § II.B.

<sup>27</sup> Rohit Chopra and Samuel A. A. Levine, "The case for resurrecting the FTC Act's penalty offense authority." *University of Pennsylvania Law Review*, Vol. 170: 71, 2021, § III.B.1.

In determining the amount of penalty imposed under Subsection (c), the trier of fact shall consider: (1) the seriousness of the violation, including the nature, circumstances, extent, and gravity of any prohibited act or practice; (2) the history of previous violations; (3) the amount necessary to deter future violations; (4) the economic effect on the person against whom the penalty is to be assessed; (5) knowledge of the illegality of the act or practice; and (6) any other matter that justice may require.<sup>28</sup>

- (25) I understand that other Plaintiff States have similar criteria in their relevant statutes and/or case law.<sup>29</sup> Common to these statutes and case law is that the deterrence of future violations is a key criterion, as under factor (3) in the Texas DTPA.<sup>30</sup> Accordingly, the focus of my analysis in response to Dr. Wiggins is on estimating an appropriate penalty amount in this case that will likely deter Google and other parties from engaging in similar conduct in the future. It is my understanding that it is up to the jury to determine the actual penalty amount and that in making its determination, the jury may need to consider a broad range of factors in addition to deterrence, such as those additional factors identified above in the Texas DTPA. While some of those other factors may be relevant to analyzing deterrence from an economic perspective (such as identifying the actual or potential harm based on the seriousness and extent of the violations, or evaluating the economic effect on the defendant), the jury may consider those other factors from a different perspective as well, i.e., increasing or decreasing the per-violation penalty amount based on the jury's assessment of the relative importance of those factors.
- (26) I draw three primary conclusions from the above discussion. First, there is no reason to limit an assessment of the appropriate penalty amount to the amount of the incremental profit obtained by the defendant, as Dr. Wiggins assumes in his analysis, particularly because that is not one of the six factors specified under the Texas DTPA, for example. Second, given the wide range of factors that the jury may consider, there is a wide range of economic and financial information that may be relevant to the jury, including not only a broad overview of the types of actual or potential harm caused by the conduct, but also information related to Google's overall financial performance, its market

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<sup>28</sup> Texas Deceptive Trade Practices Act § 17.47(g).

<sup>29</sup> See also Andrien Report, § III.E, for an overview of States' deceptive trade practice statutes.

<sup>30</sup> See, e.g., Texas Bus & Com Code § 17.47 (2023) and Utah Code § 13-11-17 (2023), where the amount of penalty is to be determined by, among other factors, the "amount necessary to deter future violations." The relevant statutes of six other plaintiff states authorize courts to award other "orders or judgments as may be necessary to prevent the use or employment by a person of any method, act or practice declared to be a violation," or similar language on the importance of prevention of future use, whether by the defendant or by another person, of deceptive trade practices in the future; see, e.g., Arkansas Code § 4-88-113 (2023), Idaho Code v 48-607 (2023), Mississippi Code § 75-24-19 (2023), Nevada Rev Stat § 598.0979 (2023), North Dakota Century Code § 51-15-07, and South Carolina Code § 39-5-50 (2023). I understand that case law on actions brought under these and other sections of the statutes has further underscored the importance of preventative measures in enforcement.

capitalization, its aggregate revenues and profits, its total revenues and profits from its Ad Tech business at issue, whether it has engaged in similar conduct in other markets, the amount of fines or civil penalties that have been assessed against it in the past, etc. – i.e., much of the information in Mr. Andrien’s report that Dr. Wiggins and Dr. Skinner claim is irrelevant in determining the appropriate penalty amount. Third, because all these statutes specify that the penalties are assessed on a per-violation basis,<sup>31</sup> it is necessary to assess both the total penalty required for deterrence and the appropriate per-violation penalty.

## II.B. The economics of deterrence and statutory penalties

- (27) The economic literature on deterrence focuses on the role of penalties in altering the balance of expected benefits and expected costs of violations.<sup>32</sup> Deterrence requires a credible threat of penalties that weighs sufficiently in the balance of expected costs and benefits. The basic considerations that matter for deterrence are: (i.) the costs to society from the conduct that the penalty is meant to prevent (and that the offender should internalize); (ii.) the gains to the offender, which matter for the offender’s cost-benefit analysis; and (iii.) the probability of detection and enforcement.<sup>33</sup>
- (28) The basic intuition of the economic approach to deterrent penalties is that social welfare equals the gains individuals obtain from committing the harmful act, less the harm caused, less the enforcement costs. For a fixed probability of enforcement, the optimal penalty is equal to the harm caused by the violation divided by the probability of enforcement.<sup>34</sup> Moreover, an individual will commit the harmful act if and only if their gain from doing so exceeds the expected penalty. Hence,

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<sup>31</sup> See Andrien Report, § III.E., for a detailed overview of the relevant statutes and Table 3 for a summary of the maximum penalties able to be awarded per violation.

<sup>32</sup> For surveys of the literature see, e.g., Steven Shavell and A. Mitchell Polinsky, “The Theory of Public Enforcement of Law.” In the Handbook of Law and Economics, Vol. 1, A. Mitchell Polinsky and Steven Shavell (editors), *Elsevier*, 2007, Chapter 6; Paolo Buccirossi, Lorenzo Ciari, Tomaso Duso, Giancarlo Spagnolo, and Cristiana Vitale, “Deterrence in Competition Law,” in *Analysis of Competition Policy and Sectoral Regulation*, Martin Peitz and Yossi Spiegel (editors), World Scientific, 2014, Chapter 15; and Wouter Wils, “Optimal Antitrust Fines: Theory and Practice.” *World Competition*, Vol 29, No 2, June 2006.

<sup>33</sup> See, e.g., Roman Weil, Daniel Lentz, and David Hoffman (eds.), *Litigation Services Handbook: Role of the Financial Expert*, John Wiley & Sons, Inc., 2012, Fifth Ed.; Hoboken, NJ, p. 5-1. (“The optimal deterrent award, putting aside punitive issues, should be equal to the ill-gotten gain derived from the unlawful act **adjusted for the probability that someone will detect the act.**” (Emphasis added.) The broader economic literature, cited throughout this section, also focuses on the need to consider the social costs and harm of the conduct as well.

<sup>34</sup> The socially optimal penalty makes the offender internalize all the costs and benefits of the violation, thus leading the offender to commit only ‘efficient violations,’ i.e., those for which the total benefits exceed the total costs, while deterring ‘inefficient violations,’ i.e., those for which the total costs exceed the total benefits; see, e.g., G.S. Becker, “Crime and Punishment: An Economic Approach” (1968) 76 *Journal of Political Economy* 169 and W.M. Landes, ‘Optimal Sanctions for Antitrust Violations’ (1983) 50 *The University of Chicago Law Review* 652.

deterrence, i.e., ensuring that an individual does not engage in the harmful act, requires that the penalty be greater than at least the gain divided by the probability of enforcement.<sup>35</sup>

- (29) For example, assume the wrongdoer expects to gain \$100 from a given violation, and there is a 10 percent probability of detection; from an economic perspective, the penalty must be at least \$1,000 in order for the penalty to be sufficient to deter the conduct.<sup>36</sup> In many cases, detection is not sufficient to ensure enforcement and the imposition (and collection) of a penalty: enforcement is costly, there are limited enforcement resources, and cases may be dismissed before trial for a variety of reasons. Assume in the immediately preceding example that once actionable conduct is detected, there is still only a 10 percent probability of a successful enforcement action resulting in a penalty being paid. In that event, the deterrent penalty must be greater than \$10,000, i.e., \$100 divided by 1% (10% probability of detection x 10% probability of enforcement = 1% probability of detection and enforcement). Thus, the amount of a penalty necessary for deterrence will generally be a multiple of the financial benefits to the wrongdoer; and depending on the probability of detection and enforcement, it may be many multiples of those benefits. Moreover, if the harm to society is greater than the gains to the wrongdoer from the violation, social welfare considerations require that the penalty be even larger.<sup>37</sup>
- (30) The economics literature provides additional important insights for thinking about the level of penalties required to deter wrongdoing:
- A lower probability of detection and enforcement requires a higher penalty to ensure deterrence. In practice, “because the likelihood of being caught by a law enforcement agency is usually very low, basic deterrence theory indicates that penalties on those who are caught must be severe.”<sup>38</sup>
  - Since enforcement is costly, it makes economic sense to have relatively large penalties and a low probability of detection.<sup>39</sup>

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<sup>35</sup> Deterrence requires that the penalty > (gain to individual from offence) / (probability of detection and enforcement).

<sup>36</sup> See also Chopra, Rohit and Samuel A. A. Levine, “The Case for Resurrecting the FTC Act’s Penalty Offense Authority,” *University of Pennsylvania Law Review* 170, no. 71 (2021): 100. See in particular the examples in fns. 136 and 137.

<sup>37</sup> Anticompetitive conduct creates “deadweight loss,” which occurs when markets are out of competitive equilibrium, and therefore the social harm from competition-related violations generally exceeds the gain.

<sup>38</sup> Chopra, Rohit and Samuel A. A. Levine, “The Case for Resurrecting the FTC Act’s Penalty Offense Authority,” *University of Pennsylvania Law Review* 170, no. 71 (2021): 99.

<sup>39</sup> Steven Shavell and A. Mitchell Polinsky, “The Theory of Public Enforcement of Law,” in the Handbook of Law and Economics, Vol. 1, A. Mitchell Polinsky and Steven Shavell (editors), *Elsevier*, 2007, Chapter 6, § 7.

- If gains (or harm) are difficult to determine with certainty, or if the probability of deterrence is uncertain, deterrence generally requires that penalties be higher to guard against the risk of underdeterrence.<sup>40</sup>
- The public imposition of penalties has a deterrent effect because it sends a credible signal that violations will be punished. This is particularly important in the presence of availability bias, which leads people to disproportionately focus on recent and well-publicized incidents; and overconfidence bias, which leads people to systematically underestimate the probability of bad things happening.<sup>41</sup> Appropriate deterrent penalties may also have other beneficial effects, such as reinforcing the commitment of law-abiding people to the rule of law.<sup>42</sup>
- There will be underlying differences in the gains obtained by particular offenders, even for the same type of violation, and hence, the optimal penalty for deterrence is higher for some offenders than others. If a firm (or person) is a repeat offender, then the previous penalty was insufficiently high to deter them, suggesting that the optimal penalty is higher for them.<sup>43</sup>
- If a firm, rather than an individual, is responsible for a violation, this gives rise to “principal-agent” problems and additional considerations,<sup>44</sup> discussed further below.
- Appropriate penalty amounts depend on offenders’ financial resources for at least two reasons. First, the risk of “overdeterrence” is lower for those with large financial resources, as discussed further below. Second, firms or people with less financial resources may behave as though they were more risk-averse, for example because they have more limited access to capital markets, or simply because a given penalty amount is more likely to cause financial difficulties (including bankruptcy) for a firm with more limited financial resources. The optimal penalty tends to be lower in the risk-averse case, since the penalty does not need to be as high to achieve the desired degree of deterrence.<sup>45</sup>
- For deterrence to be effective, one needs to assess the total benefits from the conduct to derive an appropriate deterrent penalty, rather than limiting the analysis to only a portion of those benefits. Thus for example, if conduct is implemented on a global basis (as with Google’s

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<sup>40</sup> Steven Shavell and A. Mitchell Polinsky, “The Theory of Public Enforcement of Law,” in the Handbook of Law and Economics, Vol. 1, A. Mitchell Polinsky and Steven Shavell (editors), *Elsevier*, 2007, Chapter 6, §§ 7 and 15; and Wouter Wils, “Optimal Antitrust Fines: Theory and Practice.” *World Competition*, Vol 29, No 2, June 2006, §§ I.2.b and II.A.2.

<sup>41</sup> Wouter Wils, “Optimal Antitrust Fines: Theory and Practice.” *World Competition*, Vol 29, No 2, June 2006, § II.A.

<sup>42</sup> Wouter Wils, “Optimal Antitrust Fines: Theory and Practice.” *World Competition*, Vol 29, No 2, June 2006, §§ II.B.

<sup>43</sup> Steven Shavell and A. Mitchell Polinsky, “The Theory of Public Enforcement of Law,” in the Handbook of Law and Economics, Vol. 1, A. Mitchell Polinsky and Steven Shavell (editors), *Elsevier*, 2007, Chapter 6, § 22.

<sup>44</sup> A. Mitchell Polinsky and Steven Shavell, “Public Enforcement of Law,” in the New Palgrave Dictionary of Economics, Steven N. Durlauf and Lawrence E. Blume (editors), Second Edition, 2008.

<sup>45</sup> Steven Shavell and A. Mitchell Polinsky, “The Theory of Public Enforcement of Law,” in the Handbook of Law and Economics, Vol. 1, A. Mitchell Polinsky and Steven Shavell (editors), *Elsevier*, 2007, Chapter 6, § 7.2.

conduct at issue), assessing a penalty only based on the benefits obtained within a narrow geographic territory, even adjusting for the probability of enforcement, will not be sufficient to deter the conduct, since the expected benefits from the conduct will exceed its (probability adjusted) expected cost.<sup>46</sup> For the same reason, to determine an appropriate deterrent penalty for conduct that persists over time, one needs to consider the benefits (or social harm) over the entire expected or actual time period of the conduct. Ultimately, the amount of the deterrent penalty will still be limited by the statutes applicable to a given enforcement agency; thus, if only a small number of actionable violations occurred in an enforcement agency's jurisdiction, the amount of the penalty will be limited by the maximum per violation penalty specified in the statute, which may be less than the amount necessary for deterrence.

- (31) If the offender is otherwise engaged in socially beneficial activities, "overdeterrence" is a concern, and penalties should account for the offender's continued ability to engage in these socially beneficial activities. For example, very high fines may jeopardize a firm's financial stability or access to capital markets, in which case, a firm may be forced to exit a given market, which in turn may lead to reduced innovation, increased market concentration, decreased competition, and lower consumer welfare. While it is important to consider the risks of overdeterrence in estimating an appropriate deterrent amount, these risks require a number of qualifications: (i.) the risk of general underdeterrence may be more significant than the risk of a few convicted firms being bankrupted by high fines; (ii.) if bankruptcy proceedings are efficient, the costs of bankruptcy may be low; (iii.) penalties exist to deter violations in all industries, suggesting they may need to be higher than might be optimal for just a single firm; and (iv.) "moral hazard" issues may arise, as it may induce firms to undertake actions to reduce their level of expected fines simply by reducing their apparent ability to pay, such as by taking on more debt than is otherwise efficient.<sup>47</sup>
- (32) Finally, the total volume of commerce, such as the total revenues or profits earned by the defendant, may be relevant in determining appropriate monetary remedies, depending on the context of the violation. For example, if a mortgage originator fails to perform required underwriting but fraudulently misrepresents to the market that it has, the regulator or enforcement agency may be concerned not just with the incremental profits the lender earned on the loans it should not have issued to poor credit quality borrowers (i.e., the disgorgement of its profits relative to the "but for world"); or with the damages suffered by the ultimate holders of those mortgages (i.e., making whole the holders of defaulted or underperforming loans that would not have been issued in the

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<sup>46</sup> Paolo Buccirossi, Lorenzo Ciari, Tomaso Duso, Giancarlo Spagnolo, and Cristiana Vitale, "Deterrence in Competition Law," in *Analysis of Competition Policy and Sectoral Regulation*, Martin Peitz and Yossi Spiegel (editors), *World Scientific*, 2014, Chapter 15, § 3.1.

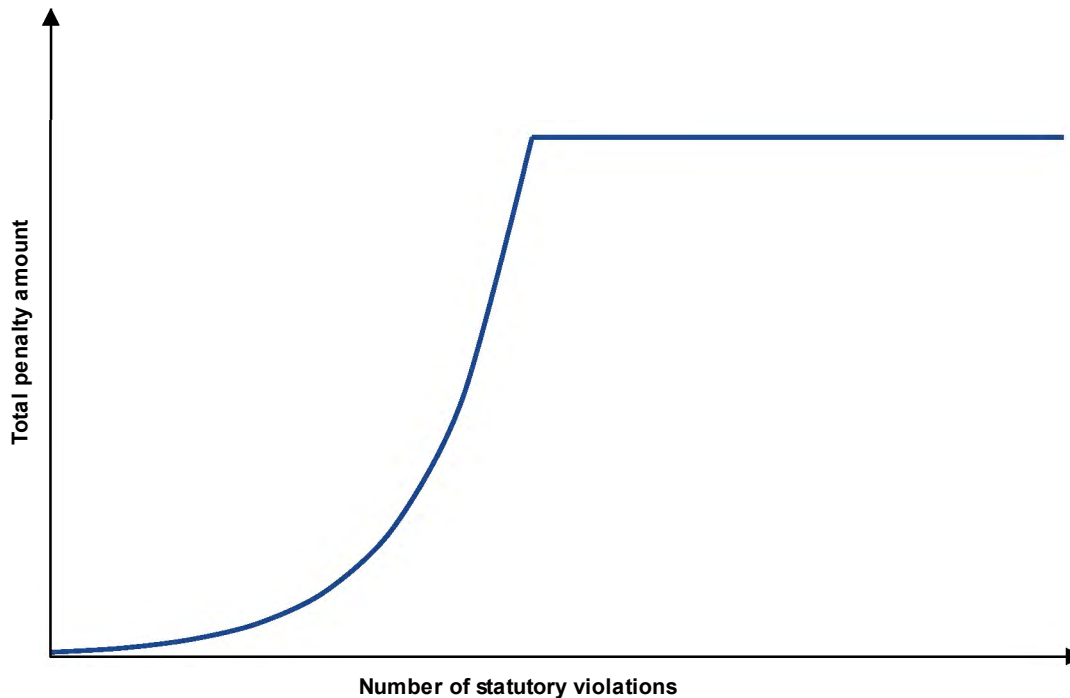
<sup>47</sup> Paolo Buccirossi, Lorenzo Ciari, Tomaso Duso, Giancarlo Spagnolo, and Cristiana Vitale, "Deterrence in Competition Law," in *Analysis of Competition Policy and Sectoral Regulation*, Martin Peitz and Yossi Spiegel (editors), *World Scientific*, 2014, Chapter 15, § 2.4.



“but for world”); but they may also be concerned about the total revenues or profits earned by the mortgage originator from all its unlawful originating activity, regardless of the incremental benefits received or harm caused, as all its revenues and profits were affected (or tainted) by the fraud.

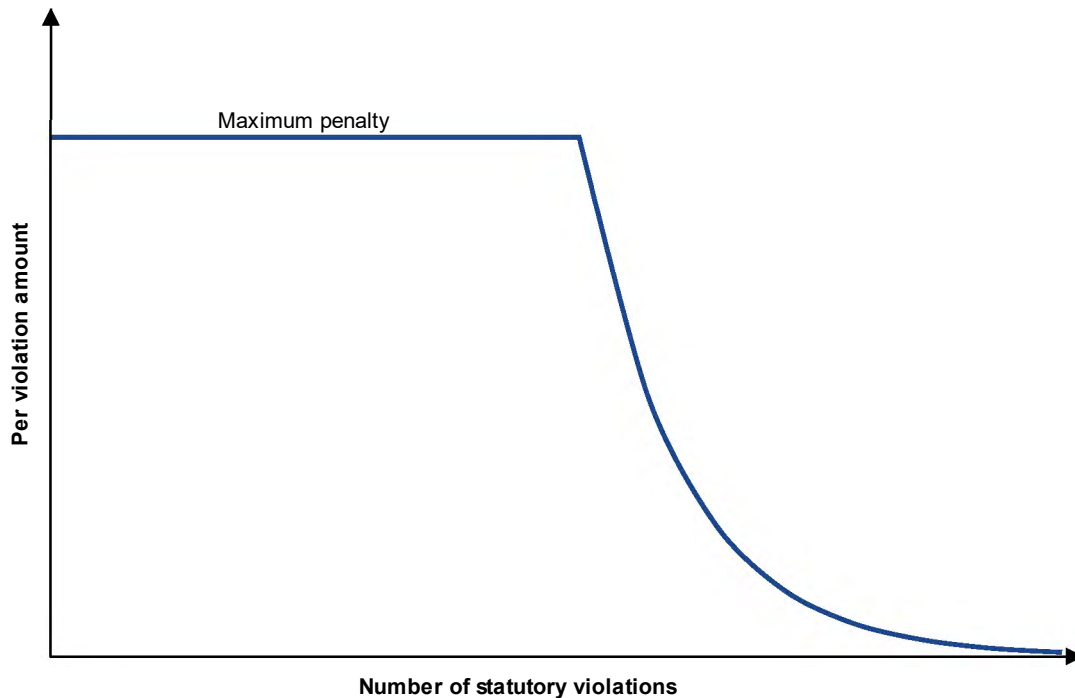
- (33) As discussed above, in the Plaintiff States’ statutes at issue, penalties are assessed on a per-violation basis. In the figures below, I summarize the implications of the economic literature reviewed above for the relationship between the number of violations and the optimal level of penalties. The specific numbers I use are purely for illustrative purposes. First, consider the total penalty required for deterrence; see Figure 1 below. Because both the harm and gain increase with the number of violations, so should the required total penalty necessary for deterrence. However, at some point, the level of the penalty is sufficiently high such that optimal deterrence has been achieved or the risk of overdeterrence exceeds the benefit of higher penalties. At that point, the total penalty amount no longer increases with the number of violations, and the curve flattens. As discussed further below, in this instance, it is my opinion that whether the relevant number of statutory violations is the number calculated by Dr. Wiggins (579 billion) or Mr. Andrien (29 trillion), Google should be considered to be in the flat portion of the aggregate penalty curve. In other words, given the exceptionally large number of potential violations in this case, even if one were to use Dr. Wiggins’s number, if the jury were to find that the conduct violates the relevant statutes, the appropriate deterrent amount should be determined not based on the precise number of statutory violations, but rather based on broader considerations of the total amount necessary to deter the conduct in the future.



**Figure 1: Total deterrent penalty amount with per-violation penalties**

- (34) Figure 2 depicts the implications for the optimal penalty per violation. Initially, for a small number of violations, the per-violation penalty is the optimal penalty based on the economic considerations discussed above. In general, as the total penalty increases with the number of violations, the per-violation penalty can increase or decrease. For example, if the gains or harm increase proportionately with the number of violations (or the optimal level is already constrained by the maximum statutory penalty per violation), the penalty per violation is constant, as illustrated in Figure 2. Then, at some point, the maximum total penalty is achieved, at which point the total penalty no longer increases, and so the optimal per-violation penalty decreases with each additional violation. These graphs highlight why, given the large number of potential violations in this case, it is important to begin a deterrence analysis by first determining an aggregate deterrence penalty amount, and then converting that into a corresponding per penalty violation, rather than the reverse: if instead, one were to begin the analysis by attempting to develop a per violation amount, the result could be an aggregate penalty that either is insufficient for deterrence or results in overdeterrence. Thus, the appropriate per violation deterrent penalty will necessarily be small; not because it indicates that the harms or benefits from the conduct were very small, but because whether the conduct is deterred depends on the aggregate penalty amount to be assessed (the numerator), and because the number of violations (the denominator), by any measure, is exceptionally large.

Figure 2: Penalty per violation



## II.C. The implications of the “principal-agent” problem for deterrent penalties

- (35) In determining an appropriate deterrent penalty amount for a public company, such as Alphabet, where the costs of the penalty are ultimately borne by shareholders but the conduct is attributable to actions or decisions by company management, it is also important to consider the “principal-agent” problems that arise with such companies. The problem of agency between a principal and an agent, and the need to account for the potentially differing incentives between a principal and their agent, has been extensively studied in the academic literature. In many economic transactions, one party (the agent) takes actions that affect the welfare of the other party (the principal), but the agent’s actions are not completely controllable by the principal, and the agent’s interests may diverge from those of the principal.<sup>48</sup> A classic example of a principal-agent problem is in the context of a bank: a bank manager – acting as the agent of the banks’ owners, who are the “principals” in a banking enterprise – may have a financial incentive to be insufficiently attentive to the credit risks on the loans that they make if their compensation is tied to the volume of loans they originate; and if a

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<sup>48</sup> See, e.g., Bengt Holmstrom, “Moral Hazard and Observability,” *Bell Journal of Economics* 10, no. 1 (Spring 1979): 74–91.

default on the loans is likely to occur after the end of their employment (or if a future loan default does not enable a bank to claw back a manager's prior compensation). In that scenario, the costs of a loan default are borne entirely by the principals. This "principal-agent" problem is not just an academic construct: extensive loan defaults and bank trading desk losses during the 2008 – 2009 financial crisis have been attributed, at least in part, to this misalignment of incentives.<sup>49</sup>

- (36) The principal-agent problem is a general problem applicable to publicly-traded firms such as Alphabet. Public ownership allows for the separation of ownership and effective control, i.e., it allows equity investors (i.e., shareholders or owners) to be distinct from managers who make day-to-day decisions. Under this structure, managers (the agents) may behave in ways that benefit them at the expense of the shareholders (the principals). In the context of this case, the principal-agent problem may manifest itself if Alphabet's managers disregard or pay limited attention to the potential cost of their decisions on Alphabet's shareholders, e.g., by choosing to engage in deceptive trade practices, when the ultimate cost of such practices (if detected by enforcement agencies) is borne by Alphabet's shareholders, rather than by its managers.
- (37) The economics and finance literature has proposed alternative solutions to the principal-agent problem. These include offering appropriate incentives for managers to make decisions in line with the shareholders' interests or closer monitoring of the firm's managers. If these are effective, the interests of shareholders and managers would be aligned such that managers would not engage in conduct that, if detected, would result in the imposition of penalties, hurting the shareholders. In reality, neither of these alternative solutions necessarily fully addresses the principal-agent problem.<sup>50</sup>
- (38) *Incentives may be ineffective*: Because the source of the principal-agent problem in publicly traded firms is the disconnect between ownership and effective control, an obvious solution is to effectively compensate the managers in part with stock (or stock options) so as to align incentives. In line with this approach, firms such as Alphabet provide stock-based compensation (i.e., stock grants and stock options) to its employees.<sup>51</sup> Stock-based compensation for management, however, will still not fully align management's incentives with the outside shareholders, for two reasons. First, management compensation is seldom based *entirely* on stocks; as such, there remains some degree of principal-

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<sup>49</sup> See, e.g., Sunit Shah, "The Principal Agent Problem in Finance," March 1, 2014, *CFA Institute Research Foundation* L2014-1, available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2574742](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2574742).

<sup>50</sup> Richard Brealey, Stewart Myers, and Franklin Allen, *Principles of Corporate Finance*, (McGraw Hill, Eighth Edition), Chapter 12, pp. 303–309.

<sup>51</sup> In 2023, Alphabet recorded a stock-based compensation expense of \$22.46 billion. See Alphabet Inc., *Form 10-K 2023*, January 30, 2024, 55.

agent problem.<sup>52</sup> Second, and most importantly, it is management's current performance that results in the award of stock-based compensation (in addition to cash bonuses and increases in salaries).<sup>53</sup> As such, the value of the stock awards (as well as cash bonuses or salary increases) that management receives from engaging in misconduct that increases the company's current profits (and the current stock price) are likely to exceed the financial impact to management of a future penalty imposed on the company as a result of their conduct, which is likely borne by all shareholders.

- (39) For example, assume that a Google Product Manager were able to increase the company's profits by \$100 million in a given year as a result of deceptive conduct, and for which the manager receives \$1 million worth of stock-based compensation. Assume further that several years later, a \$20 billion penalty is assessed against the company, when its pre-penalty valuation is \$2 trillion; and that the \$20 billion penalty is sufficiently large to cause a commensurate decline in the stock market capitalization of \$20 billion, or 1% of the value of the stock. In that scenario, the value of the manager's stock award also falls by 1%, from \$1 million to \$990,000. While the manager would certainly prefer the \$1 million value to the \$990,000 value of their stock award, they are still far better off – by \$990,000 – having engaged in the deceptive conduct than not. This simply reflects the fact that the costs to shareholders of the manager's conduct will not be fully internalized by the manager, even when the manager receives stock-based compensation. In fact, this will always be so, as long as the manager receives any amount of compensation for their current performance that is tied to the current profitability of the firm, whether that compensation is in the form of cash or stock. Thus, the principal-agent problem persists even with performance-based stock compensation.
- (40) *Monitoring may be ineffective:* It is costly for a shareholder to monitor managers. Importantly, while the costs are borne entirely by the monitoring shareholder, all shareholders enjoy the benefits of having disciplined managers. So, each shareholder has an incentive to "free-ride" on someone else's effort, leading to insufficient monitoring by shareholders. This is particularly challenging when there are a large number of dispersed shareholders, each with a small share of the potential benefits. While a board of directors, which is supposed to represent the shareholders' interest, could ameliorate the free-rider problem, studies have identified situations or reasons why they are

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<sup>52</sup> Brian Hall and Kevin Murphy, "The Trouble with Stock Options," *Journal of Economic Perspectives* 17, no. 3 (Summer 2003): 49–70 [hereinafter, "Hall and Murphy (2003)"]; Alphabet's top management receive a base salary and are not wholly compensated using stock-based compensation. For example, CEO Sundar Pichai received a base salary of \$2 million in 2023. See Alphabet Inc., *Form DEF 14A*, April 26, 2024, 53.

<sup>53</sup> For instance, employees may be granted stock options for which they receive stock when they exercise the option. An improvement in stock price offers employees a greater incentive to exercise the option. See Hall and Murphy (2003), pp. 50–51.

insufficiently effective.<sup>54</sup> Overall, the board is more likely to act when managerial decision-making has a sufficient impact on shareholders.<sup>55</sup>

- (41) Besides the board, the free rider problem may be attenuated if there are shareholders with concentrated or large ownership. With more at stake, such shareholders have a greater incentive to play an active role in firm monitoring (i.e., to be “activist” investors). In many cases, these tend to be large institutional investors, such as mutual funds and hedge funds, rather than retail investors. Over 60% of Alphabet stock is owned by institutions.<sup>56</sup> However, much like the board, institutional investors suffer from their own agency problems and do not provide a complete solution to the problem. They, too, are more likely to act when the upside of their activism outweighs the costs of those actions.<sup>57</sup>
- (42) In summary, the principal-agent problem is endemic to a publicly-traded firm like Alphabet. When management engages in potentially actionable conduct, like deception, it exposes the shareholders to the risk of a penalty for the firm’s misconduct. As Dr. Skinner acknowledges, penalties could impose costs on the shareholders.<sup>58</sup> Even if the shareholders – including large individual or institutional investors with a substantial stake in Alphabet – recognize this expected loss, they may not have an incentive to preempt or deter such misconduct unless the expected impact of the penalty is sufficiently large. Certain actionable managerial conduct may also benefit shareholders, e.g., as with such conduct that allows the firm to earn higher long-term profits. All else equal, the fact that there are likely shared benefits – at least over the short-term, and if undetected, even over the long-term – would further disincentivize shareholders from monitoring management’s conduct.

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<sup>54</sup> See Eliezer Fich and Anil Shivdasani, “Are Busy Boards Effective Monitors?” *Journal of Finance* 61, no. 2 (2006): 689–724 (they find that firms with more “busy” directors have lower market-to-book ratios than other firms). See also, Ivan Brick, Oded Palmon, and John Wald, “CEO Compensation, Director Compensation, and Firm Performance: Evidence of Cronyism?” *Journal of Corporate Finance* 12, no. 3 (2006): 403–23 (they suggest the possibility of cronyism between the directors and the CEO).

<sup>55</sup> Richard Brealey, Stewart Myres, and Franklin Allen, *Principles of Corporate Finance*, (McGraw Hill, Eighth Edition), Chapter 2, p. 25 (“Boards of directors are sometimes portrayed as passive stooges who always champion the incumbent management. But when company performance starts to slide and managers do not offer a credible recovery plan, boards do act”).

<sup>56</sup> Defined as positions from SEC form 13F filings plus data aggregated from the mutual funds of non-13F filers. Source: S&P Capital IQ, Alphabet Inc. Public Ownership Summary, accessed August 29, 2024; SEC Form 13F is the reporting form filed by institutional investment managers and must be filed by managers that operate in the U.S. and exercise investment discretion over \$100 million or more in securities. See SEC, “Frequently Asked Questions About Form 13F,” May 25, 2023, <https://www.sec.gov/divisions/investment/13ffaq>, accessed August 29, 2024.

<sup>57</sup> Lucian Bebchuk, Alma Cohen, and Scott Hirst, “The Agency Problems of Institutional Investors,” *Journal of Economic Perspectives* 31, no. 3 (Summer 2017): 89–102.

<sup>58</sup> Skinner Report, ¶ 15 (“certain adverse consequences the proposed penalty could have on Alphabet’s shareholders, business, competitive position, and ability to innovate”).

In such a case, for a penalty to be an effective deterrent, the expected impact of the penalty would have to be even larger for shareholders to undertake effective remedial steps at the firm.

- (43) The above review is helpful for determining the amount of a penalty that would be necessary to incentivize shareholders to monitor management and deter future misconduct, if actionable conduct is detected and found to be a violation of the relevant statutes. In a public company like Alphabet, the stock price serves as a market barometer of shareholder value. A large price reaction has a correspondingly large impact on a shareholder, providing a larger incentive to monitor and deter misconduct. Unless a penalty amount is large enough to have a sufficiently large impact on the stock price, thus spurring the shareholders to monitor management, it would be ineffective for purposes of subsequent deterrence.

### III. Scope of the alleged conduct and associated harm

- (44) Dr. Wiggins narrowly focuses his analysis of the scope of the alleged conduct on a single Google product, AdX, and on “the number of transactions allegedly ‘affected’ by Google’s misconduct.”<sup>59</sup> Dr. Skinner focuses on only three of Google’s six DVAA, i.e., Ad Tech products.<sup>60</sup> Given the structure and economics of the Ad Tech industry, however, and the breadth of the conduct at issue in the Plaintiff States’ claims, Dr. Wiggins’s and Dr. Skinner’s analyses focus on an overly narrow set of products and transactions. In this section, I first summarize my understanding of the relevant Ad Tech industry and its main components. I then discuss what the economics of the market implies about the likely scope of the impact of the conduct at issue, in terms of both the specific products likely impacted by the conduct and the types of likely benefits (to Google) and harm to others, including publishers, advertisers, competitors, and ultimately consumers.

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<sup>59</sup> Wiggins Report, ¶ 118; see Wiggins Report, §§ III.B and III.C for a high-level discussion of his approach Wiggins Report, § IV for details of his calculations.

<sup>60</sup> Skinner Report, ¶ 22 (“I understand that Plaintiffs’ remaining claims in this matter focus on certain DVAA products; specifically, Google Ad Manager (including certain functions that had been performed by AdX and DFP), Google Ads, and DV360. I further understand that certain of the revenues and profits attributable to these products relate to transactions involving in-app ads, which I understand Plaintiffs do not consider to occur in the relevant markets.”) I note that Dr. Skinner provides no evidence to support his decision and fails to cite to Plaintiff reports for his understanding. Instead, he cites to a 50-page section in the Fourth Amended Complaint (§ VI and pages 30–34 therein) without explaining how that section informs his understanding or how he reconciles his understanding with the analyses put forward by Plaintiff experts; see Skinner Report, footnotes 23 and 24.

### III.A. Scope of Google's Ad Tech products and market participants potentially affected by conduct at issue

- (45) The online display advertising industry includes three types of participants and technologies: (i.) publishers and ad servers; (ii.) advertisers and ad buying tools; and (iii.) ad exchanges.<sup>61</sup> Publishers are sellers of ad inventory on their webpages, a process facilitated by ad servers in either live ad auctions or direct deals.<sup>62</sup> Advertisers are buyers of ad inventory, a process facilitated by ad buying tools.<sup>63</sup> Ad exchanges and ad networks match advertisers (buyers) to publishers (sellers) and run the auctions to determine which advertiser wins the impression on a publisher's webpage or app.<sup>64</sup>
- (46) Figure 3, below, taken from an internal Google presentation from January 2020, provides a visualization of how Google's Ad Tech products are connected. Note that Google's products interact with competitors' demand-side platforms ("DSPs") and supply-side platforms ("SSPs," non-Google exchanges). These products also feed into other forms of digital advertising and Google products, including YouTube, Google Play, Gmail, as well as Google Search (through Google Ads/AdWords).<sup>65</sup>
- (47) On the advertiser (marketer/buyer) side, Google offers the following demand-side ad buying tools:<sup>66</sup>
- DV360 and CM 360 (formerly known as DCM) generally serve larger, more sophisticated advertisers.

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<sup>61</sup> See Expert Report of John Chandler, June 7, 2024 [hereinafter "Chandler Report"], § VII, for an overview of the ad tech industry.

<sup>62</sup> See, e.g., Chandler Report, § VII.C, and Expert report of Matthew Weinberg, June 7, 2024 [hereinafter "Weinberg Report"], § III.A.1.

"There are two key ways through which an ad server might sell inventory. In a live ad auction, the ad server learns that a particular user is visiting the publisher's webpage, and while the page loads, runs an auction for the right to display an ad to this particular user. The auction begins only after the user is known, so potential advertisers can submit a bid based on the finegrained information they learn about the user. In a direct deal, the publisher pre-arranges a contract with an advertiser to display their ad some number of times across some period at some predetermined price per impression, perhaps to users that satisfy some coarse targeting criteria. The ad server manages that deal as users visit the publisher's webpage. Because of this, while targeting criteria can still be used, it is coarser in comparison to the real-time data available in a live ad auction." (Weinberg Report, ¶ 69)

One way ad servers sell an impression is through a process called a "waterfall," whereby they sequentially check for a match with a potential demand source (a line item) and typically prioritize direct deals ahead of ad exchanges. Alternatively, header bidding solicits bids from multiple exchanges simultaneously, thereby addressing the inefficiencies of sequentially bidding. See, e.g., Weinberg Report, § III.B, for details.

<sup>63</sup> See, e.g., Chandler Report, § VII.D, and Weinberg Report, § III.A.2.

<sup>64</sup> See, e.g., Chandler Report, § VII.E, and Weinberg Report, § III.A.3.

<sup>65</sup> See Chandler Report, § V for a discussion of different digital marketing channels, and § VIII for a detailed discussion of Google's ad tech products.

<sup>66</sup> See also Chandler Report, § VII.D. and "Introducing Campaign Manager 360," *Campaign Manager 360 Help*, accessed August 21, 2024, <https://support.google.com/campaignmanager/answer/10157783?hl=en>

- Google Ads (formerly known as AdWords) generally serves small, less sophisticated advertisers. However, Google Ads also provides access to Google's search product by allowing targeting based on previous keyword searches.<sup>67</sup> "Advertisers who are managing their own search campaigns need to use Google Ads. And, while search is a distinct channel, once an advertiser is using Google Ads for search, the barrier is low to use it for parts of their display advertising."<sup>68</sup>

- (48) On the publisher (seller) side, Google's supply-side offers AdSense, AdMob, and DoubleClick for Publishers (DFP), which has been integrated into Google Ad Manager (GAM).<sup>69</sup> AdMob is designed specifically for mobile app developers and publishers;<sup>70</sup> AdSense is focused on websites;<sup>71</sup> and GAM is focused on large publishers and (for web and app) supports multiple ad networks and exchanges (including those of Google and third parties).<sup>72</sup>
- (49) Buyers and sellers are matched through Google's ad exchange called AdX and Google's ad network called Google Display Network (GDN).<sup>73</sup> AdX has been combined with DFP into GAM.<sup>74</sup> GDN includes an advertiser-facing component (Google Ads/AdWords) and a publisher-facing component (AdSense and AdMob) and acts as an intermediary between advertisers and sellers.<sup>75</sup>

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<sup>67</sup> Chandler Report, ¶ 182.

<sup>68</sup> Chandler Report, ¶ 182.

<sup>69</sup> "Compare Ad Manager, AdSense, and AdMob," *Google Ad Manager Help*, accessed August 21, 2024, <https://support.google.com/admanager/answer/9234653?hl=en>.

<sup>70</sup> "AdMob vs. Google Ad Manager. Which One Is Better?" *Ad.Plus*, accessed August 30, 2024, <https://blog.ad.plus/google-ad-manager-vs-admob/>.

<sup>71</sup> "Compare Ad Manager, AdSense, and AdMob," *Google Ad Manager Help*, accessed August 21, 2024, <https://support.google.com/admanager/answer/9234653?hl=en>.

<sup>72</sup> "Advertising with Google Ad Manager," *Google Ad Manager Help*, accessed August 30, 2024, <https://support.google.com/admanager/answer/6022000?hl=en>.

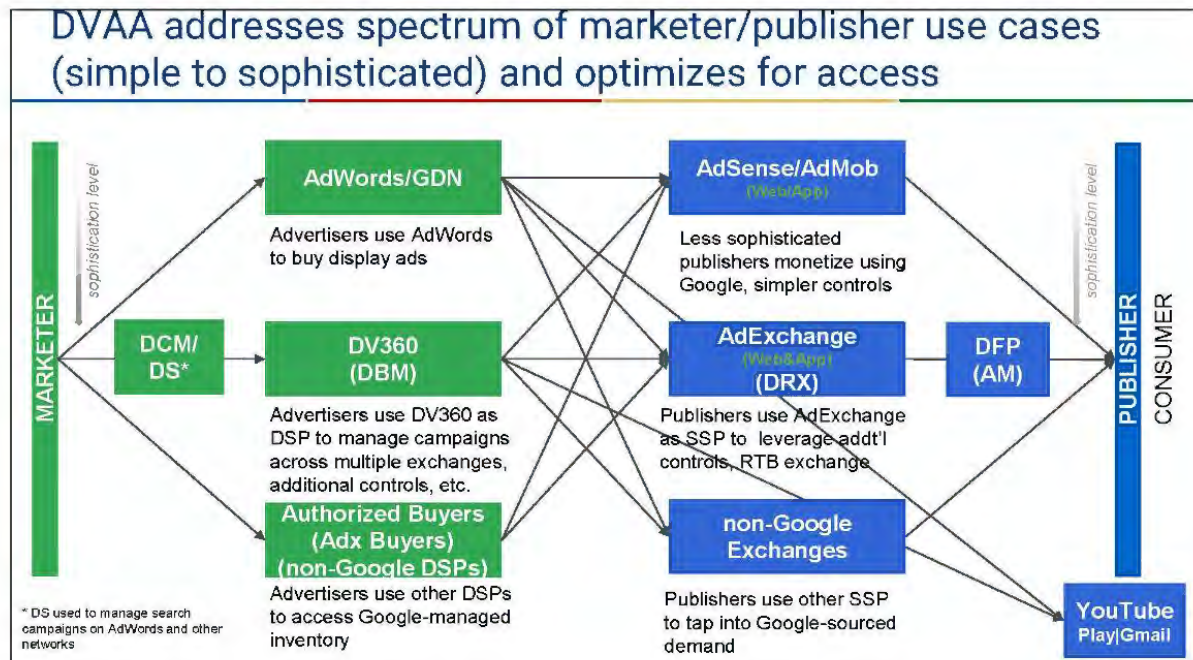
<sup>73</sup> "There are two main differences between ad networks and ad exchanges. The first is that ad networks are regarded as brokers for ads, while ad exchanges are open marketplaces, much like a stock exchange. The second difference is that ad exchanges are almost fully automated systems." (Chandler Report, ¶ 185).

<sup>74</sup> Jonathan Bellack, "Introducing Google Ad Manager," *Google Ad Manager*, June 27, 2018, <https://blog.google/products/admanager/introducing-google-ad-manager/>.

<sup>75</sup> GOOG-DOJ-AT-00221276 at -1310 and -1311 (2018 internal Google Display Network overview).



Figure 3: Google DVAA products and their interactions



Source: GOOG-NE-09556461 at -6463.

Notes: The names of several Google products have changed since this figure was made in 2020. For example, DCM is now CM360, AdWords is now Google Ads, and AdExchange and DFP are together now Google Ad Manager (GAM).

- (50) See Appendix D for additional depictions of Google's Ad Tech products and those of its competitors.

### III.B. The two sides of the Ad Tech industry (publishers and advertisers) are interdependent

- (51) Parts of the Ad Tech industry, as discussed above, have features with characteristics of what the economics literature refers to as two-sided markets,<sup>76</sup> including the presence of indirect network effects.<sup>77</sup> Two-sided markets have two distinct sets of participants, e.g., publishers and advertisers, who interact through an intermediary (commonly called a platform), e.g., an ad exchange or network.<sup>78</sup> When the value of the platform to one set of participants, e.g., advertisers, depends on

<sup>76</sup> Note that I am using the term "two-sided markets" as it is used generally in the academic economics literature. I am not opining on the appropriate definitions of relevant antitrust markets for the Ad Tech industry.

<sup>77</sup> For a recent survey of the economic literature on two-sided markets, see Jullien, B., Pavan, A., and Rysman, M. (2021). Two-sided markets, pricing, and network effects. In Ho, K., Hortaçsu, A., and Lizzeri, A., editors, *Handbook of Industrial Organization*, volume 4, chapter 7, pages 485–592. Elsevier.

<sup>78</sup> I understand that Dr. Joshua Gans has evaluated and defined four relevant product markets, only one of which (the

the behavior of the other set of participants, e.g., publishers, there are feedback loops between the two sides of the platform, which are called indirect network effects.<sup>79</sup>

- (52) Scale (or aggregation) plays an important role in two-sided markets. Dr. Chandler, in his analysis of Ad Tech industry, points to the role of scale in facilitating transactions and enhancing the value of the platform:

“On the supply side, there are publishers, like websites with space where ads can be displayed. On the demand side, there are advertisers who seek to display their ads to a specific audience. In order to scale up and facilitate the transactions between the two sides, a broader set of entities have emerged, which includes supply side platforms (SSPs) which help aggregate advertising inventory, demand side platforms (DSPs) which help aggregate and place advertising inventory, and exchanges which facilitate the exchange between the two sides.”<sup>80</sup>

- (53) Similarly, Dr. Weinberg explains the importance of scale for the value that an exchange brings to both sides of the platform:

“Publishers (via ad servers) and advertisers (via ad buying tools) form the sell side and buy side of the markets for live ad auctions. It is not a trivial process for ad servers and ad buying tools to find each other and transact. Even for something that is commonly bought and sold, such as a designer coat, finding every interested buyer on the internet is a difficult task. As a buyer, it is also a difficult task to scour the internet to find all the designer coats you are interested in. Hence a third-party market/exchange/bazaar would be relied on to aggregate supply and demand. For example, customers go to platforms like eBay for Pokémon cards, Etsy for engraved chopsticks, and Amazon for books. In all of these cases, the customers rely on the

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market for ad exchanges for transacting indirect open web display advertising) has two distinct sets of customers and could arguably be considered a multisided transaction platform. Other distinct products or tools, such as publisher ad servers and ad buying tools for small and large advertisers, are not multisided. *See also* Gans Report, § I.D.

<sup>79</sup> “A central aspect of platform economics is the role of network effects, which apply when a product is valued based on the extent to which other market participants adopt or use the same product. Of particular interest are indirect network effects, which emerge when the adoption and use of a product leads to increased provision of complementary products and services, with the value of adopting the original product increasing with the provision of such complementary goods. For instance, as more consumers adopt a video game console such as the Sony Playstation, more game-developers invest in developing games for that platform, raising the value of the console to consumers. In this sense, indirect network effects lead the platform firm to take into account the various interdependencies between the two sides of the market, and the pertinent literature studying such interdependencies is often termed the study of two-sided markets.” (Jullien, B., Pavan, A., and Rysman, M. (2021). Two-sided markets, pricing, and network effects. In Ho, K., Hortaçsu, A., and Lizzeri, A., editors, *Handbook of Industrial Organization*, volume 4, chapter 7, pages 485–592. *Elsevier*, p. 488).

<sup>80</sup> Chandler Report, ¶ 143.

platform primarily to match them to sellers. The market for impressions is no different, and ad exchanges exist to help publishers meet advertisers.”<sup>81</sup>

- (54) Another characteristic of two-sided markets is that such “[p]latforms set prices on each side of the market accounting for the complex interactions between the various platform’s users.”<sup>82</sup> Indeed, Rochet and Tirole highlight the interdependencies in the fees (prices) and volume of transactions on both sides of the platform in their definition of two-sided markets:

“We define a two-sided market as one in which the volume of transactions between end-users depends on the structure and not only on the overall level of the fees charged by the platform. A platform’s usage or variable charges impact the two sides’ willingness to trade once on the platform and, thereby, their net surpluses from potential interactions; the platforms’ membership or fixed charges in turn condition the end-users’ presence on the platform. The platforms’ fine design of the structure of variable and fixed charges is relevant only if the two sides do not negotiate away the corresponding usage and membership externalities.”<sup>83</sup>

### **III.C. Google’s conduct likely had broad impacts on market participants due to complex interdependencies among Ad Tech products**

- (55) Interdependencies between the buyer and the seller sides of the Ad Tech industry imply that all of Google’s DVAA products are interconnected. Therefore, Dr. Wiggins and Dr. Skinner err when focusing narrowly on a subset of Google’s DVAA products. In contrast, the reports of Dr. Weinberg and Dr. Chandler analyze and recognize these interdependencies and account for them in drawing conclusions about the scope of the conduct. Mr. Andrien similarly recognizes these interdependencies when reaching his conclusions.<sup>84</sup> As I explain in this section, the conduct at issue

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<sup>81</sup> Weinberg Report, ¶ 76.

<sup>82</sup> Jullien, B., Pavan, A., and Rysman, M. (2021). Two-sided markets, pricing, and network effects. In Ho, K., Hortaçsu, A., and Lizzeri, A., editors, *Handbook of Industrial Organization*, volume 4, chapter 7, pages 485–592, Elsevier, p. 85.

<sup>83</sup> Rochet, J.-C. and J. Tirole (2006). Two-sided markets: A progress report. *RAND Journal of Economics* 37, p. 646.

<sup>84</sup> Andrien Report, § IV.F.1, e.g., “Thus Google’s deceptive misconduct affecting DFP publishers on AdX is enhanced because of publisher difficulty in leaving the platform – they cannot easily switch to a non-deceptive competitor. As I explain above, due to indirect network effects, increased AdX win rates and revenue from the deceptive misconduct results in attracting more publishers and advertisers to Google’s platform, furthering Google’s monopoly position. Hence, each type of alleged conduct reinforces the other. The deceptive misconduct alleged in this matter is thus properly viewed as part of an overall scheme by Google to dominate and maintain its place in the display advertising industry using various levers at its disposal, including the misconduct at issue. Google gained both direct and indirect benefits as a result of its misconduct.” (Andrien Report, ¶¶ 114 and 115).

is central to Google's Ad Tech business and, as I explain in the next section, more broadly impacts Google's other lines of business.

- (56) Dr. Weinberg's opening report analyzes Google's conduct at issue, how this conduct changed the auction procedures, and how these changes affected auction outcomes.<sup>85</sup> He concludes that Google's conduct impacted both AdX and GDN, i.e., both ad exchanges and ad networks, and consequently revenues for the advertiser (buyer) and publisher (seller) sides of the Ad Tech market, and revenues and win rates for rival exchanges and ad buying tools.<sup>86</sup> Moreover, as Dr. Weinberg emphasizes, Google's deceptive conduct spanned multiple years and many different instances of deceptive conduct,<sup>87</sup> as well as updated and optimized versions of that conduct, e.g., DRS v1, DRSv2, "truthful" DRS (tDRS), and the associated "dirty second-price auctions."<sup>88</sup> In his reply report, Dr. Weinberg explains how his analysis shows that "Google's entire ecosystem is deceptive,"<sup>89</sup> and every auction is affected by Google's deceptive conduct.<sup>90</sup> As a result, the benefits to Google and the harm to others are likely greater than if the conduct were isolated, and the products were independent without any market or technological interconnections.
- (57) Dr. Chandler similarly concludes that Google's conduct affected all participants, and hence all products and transactions, in the Ad Tech industry that use or interact with Google's products:

"Google's Bernanke, Global Bernanke, Bell, Reserve Price Optimization (RPO), Dynamic Revenue Sharing (DRS), Poirot, Elmo, Exchange Bidding, Dynamic Allocation (DA), Enhanced Dynamic Allocation (EDA), tying DFP to AdX, and Privacy Sandbox programs and practices entailed one or more of the following: (a) failures to adequately or timely disclose changes to the auction's mechanics and purposes; (b) unwarranted restrictions on material information needed by auction participants and intermediaries; (c) denials of equal and fair access to inventory, demand, and functionality to advertisers, publishers, ad servers, exchanges, or ad buying tools; and (d) conflicts of interest. Those programs and practices jeopardized, and

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<sup>85</sup> Weinberg Report, ¶ 11. Specifically, Dr. Weinberg's opening report main focus is on Google's conduct as regards to: Dynamic Allocation, Dynamic Revenue Sharing, Exchange bidding, Project Bernanke, Unified Pricing Rules and Reserve Price Optimization.

<sup>86</sup> Weinberg Report, ¶ 12.

<sup>87</sup> Expert Rebuttal Report of Matthew Weinberg, September 9, 2024 [hereinafter "Weinberg Rebuttal Report"], § IV.B.

<sup>88</sup> Weinberg Report, § VII.

<sup>89</sup> Weinberg Rebuttal Report, fn. 35 and § IV.

<sup>90</sup> Weinberg Rebuttal Report, § IV.G.

detrimentally affected, transparency and fairness of the auctions in which they were employed.”<sup>91</sup>

- (58) In addition, Dr. Chandler concludes that Google’s conduct impacted the structure of the Ad Tech markets and enhanced Google’s dominance in these markets:

“When faced with competitive threats, Google has strategically acquired competitors to maintain and enhance its market position. This approach has enabled Google to eliminate potential rivals and integrate valuable technologies, reinforcing its dominance in the ad tech ecosystem. Through these acquisitions, Google has built its dominant position in the display advertising market.”<sup>92</sup>

- (59) Google’s scale advantage has been commented on by rivals. [REDACTED]  
[REDACTED]  
[REDACTED]<sup>93</sup> For example, header bidding has significant benefits for market participants,<sup>94</sup> with the potential to increase competition in the industry.<sup>95</sup> To the extent that Google’s deceptive conduct (including AdX’s “last look” advantage) has undermined the benefits of header bidding,<sup>96</sup> it has had long-lasting impacts by reducing competition in the Ad Tech industry.

- (60) Based on my understanding of the industry and products at issue, as well as my review of the expert reports analyzing the conduct in more detail, I expect that Google’s conduct at issue would have had the following types of effects: (i.) an increase in effective prices paid by advertisers;<sup>97</sup> (ii.) a decrease in revenues earned by publishers;<sup>98</sup> (iii.) a decrease in revenues and profits earned by Google’s Ad

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<sup>91</sup> Chandler Report, ¶ 23, bullet 17.

<sup>92</sup> Chandler Report, ¶ 23, bullet 7 and § VIII.

<sup>93</sup> [REDACTED].

<sup>94</sup> Weinberg report, ¶¶ 150 (“In my opinion, header bidding improves publisher revenue and fill rate<sup>210</sup> in comparison to the waterfall process. Furthermore, header bidding’s auction mechanics generate higher revenue for publishers than Exchange Bidding’s auction mechanics do.”) and 156 (“The auction mechanics of header bidding (without Enhanced Dynamic Allocation) would generate increased revenue for publishers, as compared to all exchanges participating in Exchange Bidding.”), and Weinberg Rebuttal Report, § XIII.

<sup>95</sup> [REDACTED]  
[REDACTED]

<sup>96</sup> See Weinberg Report, § III.B.2, for an explanation of header bidding, Weinberg Report, § V.C, for a discussion of AdX’s “last look” advantage, and the Weinberg Report generally for a discussion of how header bidding and Google’s conduct interacted. See Andrien Report, § III.D.v, for a discussion of the Google/Facebook Network Bidding Agreement (“NBA”) and header bidding.

<sup>97</sup> See, e.g., Weinberg Report, ¶¶ 12.a, 12.d, and 12.f.

<sup>98</sup> See, e.g., Weinberg Report, ¶¶ 12.a, 12.c, 12.d, and 12.f.

Tech product competitors;<sup>99</sup> (iv.) a reduction in the financial incentives or ability for Google's Ad Tech product competitors to remain in the markets, resulting in exit by competitors and increased market dominance by Google; (v.) support for the ability of Google to maintain its win rates and revenue above a competitive level without the deceptive conduct;<sup>100</sup> and (vi.) the loss of faith and confidence of advertisers, publishers, and other actual or potential competitors to Google in the transparent functioning of ad auctions and the Ad Tech product markets more generally.<sup>101</sup> The structure of the industry, and particularly Google's large share in many of the relevant products during the conduct period,<sup>102</sup> likely significantly increased the severity of the effects of Google's conduct at issue. As a market participant such as Google increases its market shares, and as other industry participants come to rely increasingly on these types of products to participate in the "marketplaces" for these goods and services (i.e., as online publishers and online advertisers increasingly become dependent on Ad Tech technologies and exchanges to purchase and sell "programmatic" advertising space), it becomes harder or commercially impracticable for industry participants to avoid the effect of Google's conduct, as would be the case if they were able to rely on alternative, competing non-Google advertising "ecosystems."

- (61) As Dr. Chandler notes, see above, the scope of the effects of Google's conduct likely extended beyond the participants in the Ad Tech industry, i.e., publishers, advertisers, and exchanges. Higher advertising prices (for advertisers) or lower revenues (for publishers and Google's Ad Tech competitors) are equivalent to an increased cost or an additional tax on these market participants. A large economic literature finds evidence that firms pass-through higher costs or taxes to consumers, particularly when, as is the case here, the higher costs or taxes are likely incurred by all market participants.<sup>103</sup> Thus, the harm from Google's alleged conduct was likely not restricted to the participants in the Ad Tech industry, but likely extended all the way to final consumers in the form of increased costs for the products sold by both advertisers and publishers (e.g., higher newspaper subscription costs to make up for lower advertising revenues). Reduced competition resulting from Google's alleged conduct may also have adverse implications for the quality of service in the Ad Tech

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<sup>99</sup> See, e.g., Weinberg Report, ¶¶ 12.a, 12.c, 12.d, 12.e, and 12.f.

<sup>100</sup> See, e.g., Weinberg Report, ¶¶ 12.a, 12.c, 12.d, 12.e, and 12.f.

<sup>101</sup> See, e.g., Weinberg Rebuttal Report, §§ IV.B and IV.G.

<sup>102</sup> I understand Dr. Gans concludes that "Google had and continues to have a substantial degree of monopoly power in each of these markets at various times, facilitated by entry barriers and switching costs between providers of ad tech tools." (Expert report of Joshua Gans, June 7, 2024, ¶ 14.b.)

<sup>103</sup> See, e.g., James Alm, Edward Sennoga, and Mark Skidmore, "Perfect Competition, Spatial Competition, and Tax Incidence in the Retail Gasoline Market" (Fiscal Research Center, Georgia State University, FRC Report No. 112, September 2005), p. vi ("there is a one-to-one increase in the tax-inclusive gasoline price from an increase in the gasoline tax"). See also Daniel Aaronson, "Price Pass-through and the Minimum Wage," *The Review of Economics and Statistics* 83, no. 1 (February 2001): 158-169 ("restaurant prices generally rise with changes in the wage bill").



industry.<sup>104</sup> Lower publisher revenue may also have adverse implications for the quality of publishers' products, e.g., less available revenue dedicated to creating high-quality content, or a greater amount of space allocated to online or in-app advertising to make up for the lower revenue that they otherwise earn from online advertising, in part due to Google's high take-rate of advertising revenue.

### **III.D. Google's conduct likely had impacts beyond Google's third-party Ad Tech business**

- (62) Dr. Wiggins and Dr. Skinner claim, as I explain above, the impact of Google's deceptive conduct was limited to only a small subset of AdX transactions and DVAA products. My understanding of the industry and the conduct at issue suggests that their claim is incorrect and the conduct likely had impacts beyond Google's Ad Tech business. Specifically, there are several ways in which Google's scale in advertising provided it with leverage across its different business lines, including: (i.) shared data about users collected across its products; (ii.) demand-side linkages between products; and (iii.) the impact of Google's conduct at issue on AdWords. In addition, because Google is vertically integrated—it both produces Ad Tech services that it sells to others, and it also consumes them as a publisher in its own right—its advertising business on its own properties, e.g., YouTube, Gmail, and Google Play, was likely impacted by the conduct.
- (63) First, as Dr. Chandler explains, display advertising is one of many digital marketing channels, including search, social media, digital video, and in-app advertising.<sup>105</sup> Dr. Chandler concludes that success in these is interrelated because of Google's ability to collect data "across multiple touchpoints":

"Google's scale advantage in the digital advertising ecosystem is formidable, primarily due to its vast reach and extensive first-party data. Google's numerous services, including Google Search, YouTube, Google Maps, Gmail, and the Android operating system, allow it to collect a wealth of user data across multiple touchpoints. This data provides Google with unparalleled insights into user behavior, preferences, and interests, enabling highly accurate targeting and personalization of ads."<sup>106</sup>

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<sup>104</sup> Myongjin Kim, Qihong Liu, and Nicholas G. Rupp, "When Do Firms Offer Higher Product Quality? Evidence from the Allocation of Inflight Amenities," *Review of Industrial Organization* 62 (2023):149-177. I understand Dr. Gans concludes that "Google has engaged in anticompetitive conduct that has enhanced and maintained its monopoly power in these relevant markets." (Gans Report, ¶ 14.c.)

<sup>105</sup> Chandler Report, § V.

<sup>106</sup> Chandler Report, ¶ 284.

- (64) Second, Google's products are interrelated on the demand side as consumers choose between different marketing channels.<sup>107</sup> Consistent with Dr. Chandler's assessment, on its website, Google emphasizes the connections between its advertising related products: "Google Network, our name for the places where your ad can appear, including Google sites, web pages that partner with us, and other placements like mobile phone apps."<sup>108</sup> This "bundle of sites" is composed of Google's Search Network and its Display Network,<sup>109</sup> and Google emphasizes customers' ability to reallocate their advertising expenditures and programs between Google's offerings on the Google Network, including the ability of advertisers to switch between advertising on third-party publishers' properties and on Google's own properties:

"If you see that you're not getting a good return on investment from an area of the network, you can exclude individual sites on the Display Network or change your ad campaign's network settings to opt in or out of each network."<sup>110</sup>

- (65) Dr. Wiggins also discusses how advertisers may shift or reallocate spending among digital advertising channels and products.<sup>111</sup> [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

- (66) Third, it is my understanding that Google's conduct at issue affected AdWords;<sup>114</sup> which, if correct, means that the impact of the conduct would have likely also affected Google's advertising revenues and profits on Google Search, and other products that use AdWords.

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<sup>107</sup> Chandler Report, § V.

<sup>108</sup> "The Google Network," *Google Ads Help*, accessed September 4, 2024, <https://support.google.com/google-ads/answer/1721923?sjid=5862812278570074634-NA>.

<sup>109</sup> The Search Network includes "Google Search, the Shopping tab, Google Maps, and Google Groups; Search sites that partner with Google." See "The Google Network," *Google Ads Help*, accessed September 4, 2024, <https://support.google.com/google-ads/answer/1721923?sjid=5862812278570074634-NA>.

The Display Network includes "Google sites (like YouTube, Blogger, and Gmail) and thousands of partnering websites across the Internet." See "The Google Network," *Google Ads Help*, accessed September 4, 2024, <https://support.google.com/google-ads/answer/1721923?sjid=5862812278570074634-NA>.

<sup>110</sup> "Google Network," *Google Ads Help*, accessed September 5, 2024, <https://support.google.com/google-ads/answer/1752334?hl=en>.

<sup>111</sup> Wiggins Report, § II.B.2.

<sup>112</sup> Wiggins Report, ¶ 51.

<sup>113</sup> Wiggins Report, fn. 111.

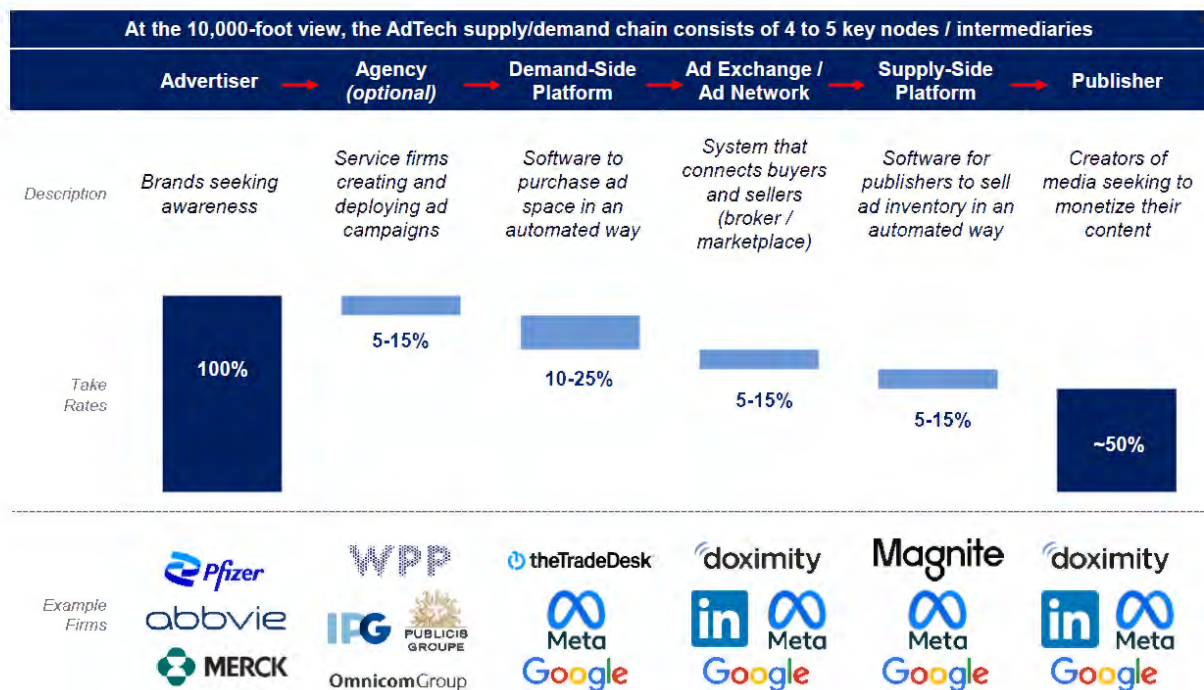
<sup>114</sup> See Weinberg Rebuttal Report, § IV.E.



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- (67) Fourth, Google is vertically integrated—it both produces Ad Tech services that it sells to others, and it also consumes them as a publisher of its own properties, e.g. YouTube, Gmail, and Google Play, in offering its own advertising space to advertisers, as shown in Figure 4, below. As discussed above, Google’s conduct at issue in its Ad Tech products impacted both advertisers and publishers. To the extent that some of Google’s conduct increased the prices paid by advertisers (while increasing the amount of Google’s profits via its take rate), it likely also increased the prices it was able to charge advertisers on its own properties. If Google’s deceptive conduct affected bidding behavior by both advertisers and publishers (e.g., for the latter, in terms of their price floors for particular types of impressions),<sup>115</sup> I would expect that conduct to also have affected advertisers’ bidding on Google’s own properties. Furthermore, since Google was able to use the conduct at issue to optimize its algorithms on AdX to maximize its own Ad Tech revenue by increasing prices paid by advertisers and maximizing its transaction volume,<sup>116</sup> that conduct likely provided Google with both data and experience with which to similarly increase the amount of revenue it earned from advertising on Google’s own properties, either by increasing the prices it charged advertisers or by increasing its volume of advertising.

**Figure 4: The Ad Tech supply chain**



Source: Elizabeth Anderson, Patrick McNally, Sameer Patel, and Joanna Zhou, “Get with the Program(matic)!” Evercore ISI, Flash Note, Healthcare Technology & Distribution, August 24, 2023, p. 8.

<sup>115</sup> See the Weinberg Report for his detailed conclusions and Weinberg Report, § I.D for a summary.

<sup>116</sup> See the Weinberg Report for his detailed conclusions and Weinberg Report, § I.D for a summary.

Note: The figure is taken from an analyst report on Doximity, which provides services to the healthcare industry, and shows the Ad Tech supply chain and approximate take-rates at each step of the chain.

- (68) The above suggests that Google's conduct at issue in Ad Tech may have provided it with broader benefits in Google's numerous other services, including YouTube, Gmail, and Search.

## **IV. Volume of commerce and profits of Google's businesses affected by the conduct at issue**

- (69) As discussed above, Dr. Wiggins and Dr. Skinner narrowly focus on a subset of the Google products in the Ad Tech market that were likely affected by the conduct at issue. Further, in assessing the appropriate penalty for the conduct at issue, Dr. Wiggins focuses his analysis solely on a narrow measure of commerce that does not measure the full extent of the conduct at issue. For example, Dr. Wiggins suggests in his lowest penalty estimate of \$21.7 million that the only relevant revenues and profits are the incremental revenues and profits that Google was able to generate from the conduct at issue in the subset of Plaintiff States with relevant penalty statutes, during periods not covered by statutes of limitation.<sup>117</sup> As noted above, however, even if one were able to identify the incremental profits reliably, they are not necessarily sufficient to determine an appropriate deterrent amount for two primary reasons. First, the amount of harm may be significantly greater than the incremental profits earned by Google; and second, the total volume of affected commerce may be significantly greater than the volume of commerce generating the incremental revenues or profits earned by Google.
- (70) With regard to the latter, consider for example, a mortgage lender who falsely claims to have performed the due diligence required by a state regulator on all 100 loans that it originates; and as a result of its failure to perform the due diligence, it issues an additional two loans to non-creditworthy borrowers. The total volume of affected commerce is that volume to which the conduct was applied, which, in the example above, is all 100 loans, even though the conduct only generated an additional two loans that would not have been issued had the lender performed the required due diligence. For purposes of establishing an appropriate deterrent penalty, the value of the 100 loans is as relevant, and likely even more relevant, than the value of the incremental two loans, as it provides a measure of the full extent of the conduct at issue.
- (71) Similarly, in this case, while the conduct at issue likely generated significant additional booked revenues and net revenues for Google (far in excess of the amounts estimated by Dr. Wiggins, as I demonstrate further below), a deterrence analysis should not be solely limited to an analysis of

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<sup>117</sup> Wiggins Report, § VII and Appendix D.

these incremental benefits. Given the centrality of auction design—and the public’s understanding of the way in which prices are determined in an auction—in determining the bids submitted by both buyers and sellers, if market participants had been aware of the programs implemented, they would have likely submitted different bids.<sup>118</sup> Different auction rules generally result in different bidding behavior. Dr. Wiggins appears to recognize that in his analysis of “bid shading” between first- and second-price auctions; and even in his assertion that bidders would have changed their bidding strategies, as they observed unexpected auction outcomes (e.g., prices and quantities inconsistent with second-price auctions).<sup>119</sup> In addition, if auction participants were induced to use AdX rather than competing exchanges on the assumption that Google was running a (clean) second-price auction, when in fact it was not, then Google’s total amount of booked revenues on AdX is relevant in assessing the severity and extent of the conduct at issue.<sup>120</sup> Thus, all of Google’s booked revenues associated with the conduct at issue are relevant in assessing the full scope of the potential harm, as they provide an indication of the volume of commerce likely affected by the conduct at issue, regardless of whether the clearing prices or volumes changed on each and every one of the underlying transactions. For the same reason, Google’s total net revenues, gross profits, and operating profits are also relevant in assessing the scope of its conduct and its actual or potential benefits.

- (72) In responding to Dr. Wiggins’s and Dr. Skinner’s analysis of Google’s revenues and profits for the potentially affected Ad Tech products, I use Google’s internal profit and loss statements (“P&Ls”) for DVAA, which is Google’s product area that includes Ad Tech products but excludes its Search, YouTube, Play, or Cloud-related products.<sup>121</sup> Google considers “Ad Tech Products” to refer to “independent products that Google and third parties provide to publishers or advertisers to facilitate the sale and purchase of display advertising inventory” and considers it to include the following products: “Google Ads (solely as used for the purchase of display advertising, not search ad inventory), Display & Video 360, Campaign Manager, AdSense for Content (but not, for the avoidance of doubt, AdSense for Search), AdMob, and Google Ad Manager.”<sup>122</sup> I follow Mr. Andrien’s approach to estimating Google’s revenues and profits from the sale of its Ad Tech products.<sup>123</sup>

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<sup>118</sup> See the Weinberg Report for his detailed conclusions and Weinberg Report, § I.D for a summary.

<sup>119</sup> Wiggins Report, Appendix D.

<sup>120</sup> Dr. Weinberg’s Rebuttal Report explains that, in addition to some participants changing their behavior in response to the deceptive conduct, some participants may be on Google’s platform because of the deceptive conduct; see Weinberg Rebuttal Report, § IV.G.

<sup>121</sup> Andrien Report, ¶ 92.

<sup>122</sup> First Amended Responses and Objections to Plaintiffs’ Third Set of Interrogatories, May 24, 2024, p. 4.

<sup>123</sup> I use the 2013–2021 DVAA P&Ls from the Andrien Report and updated 2022–2023 DVAA P&Ls from the Skinner Report. I understand that Mr. Andrien is using an updated 2021 DVAA P&L for his rebuttal report but the differences between his updated and previous 2021 DVAA P&L are small. See Expert report of Jeffrey S. Andrien, September 9, 2024 [hereinafter “Andrien Rebuttal Report”].

- (73) Figure 5 shows the revenue and profit metrics for Google's Ad Tech products. These products comprise a substantial volume of commerce, generating total booked revenues of over [REDACTED] from December 2013 to 2023. This broader amount of booked revenue provides one measure of the total volume of commerce potentially directly affected by the conduct at issue, since it represents the total amount of revenue paid to Google by advertisers. After accounting for traffic acquisition costs ("TAC") and content acquisition costs ("CAC"), the potentially affected products generated total net revenue of [REDACTED] for Google over these years. With regard to the profitability of Google's Ad Tech business, I consider two alternative measures of profits: gross profit (which is net revenues less cost of goods sold); and operating profit (which is gross profit less other operating expenses, including sales, marketing, and general administrative expenses).<sup>124</sup> Gross profit can often be used to assess the incremental profits contributed by certain conduct, if that conduct leads to incremental revenue (e.g., by raising prices or diverting sales from a competitor) without also increasing the operating costs (e.g., without requiring additional marketing and sales efforts to obtain those higher prices or to compete for those additional sales from a competitor). From December 2013 to 2023, for its DVAA business, Google recorded total gross profit of [REDACTED] and total operating profit of [REDACTED].

**Figure 5: Google DVAA P&L**

Year	Booked Revenue (\$ million)	Net Revenue (\$ million)	Gross Profit (\$ million)	Operating Profit (\$ million)
2013	[REDACTED]			
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
<b>Total</b>				

Source: Andrien Report backup for Exhibit 2 (2013–2021). Skinner Report backup for Table 4B (2022–2023).

Notes: [1] Includes AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

<sup>124</sup> See Andrien Report, Exhibit 2.

[2] Since the earliest start date for a DTPA claim is November 11, 2013 for Bernanke, 2013 line items equal the value of the source P&L line items multiplied by 1/12.

- (74) Dr. Wiggins and Dr. Skinner assume that only three products were affected by Google's conduct at issue: AdX, Google Ads, and DV360.<sup>125</sup> However, as discussed above, they do not explain why Google's revenues and profits associated with Ad Tech products would not have been affected, since they are integrated into the same digital advertising ecosystem. The excluded products—AdMob, AdSense, and CM360—account for [REDACTED] of net revenue, [REDACTED] of gross profit, and [REDACTED] of operating profit for Google Display Advertising in 2023.<sup>126</sup> A 2019 Google document regarding the DVAA P&Ls describes the "DVAA product suite" as "a result of acquisitions to play across the entire marketer-to-publisher chain."<sup>127</sup> The same document also clarifies the linkages between the three products excluded by Dr. Wiggins and Dr. Skinner and the rest of the DVAA ecosystem.<sup>128</sup>
- (75) Moreover, the scope of the affected volume of commerce by the conduct at issue could be much greater than Google's Ad Tech revenues described above. There are some types of products, and some types of conduct, for which it is straightforward to identify the volume of commerce affected by that conduct. For example, if a company CEO fraudulently misrepresents its financial performance in order to increase the company's stock price, the commerce affected by that fraud is likely limited to the trading of that company's stock, not the stock of other companies; or if a producer of a lamp contends that it tested the lamps to comply with a given standard (e.g., the UL standard), but it had not, then the affected volume of commerce is likely limited to the revenues from the sale of the lamps at issue. Here, however, the task is more complicated because of the interconnected nature of the products and markets. Since the core product at issue, AdX, is at the intersection of many different products and technologies, and it is the software that executes transactions that flow through other products (from which Google also generates profits), the volume of affected commerce is likely to be considerably greater than simply the amount of AdX booked revenue, and likely includes revenues from other Google Ad Tech products, as calculated above. Furthermore, given the integration of Google's Ad Tech products into both its Ad Tech business serving third-party publishers and its sales of advertising on its own properties, as discussed above, the volume of

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<sup>125</sup> Dr. Wiggins includes only Google's revenues from AdX, Google Ads, and DV360 in his calculation of Google's per-transaction revenue, which is then used as an input to his per-violation penalty estimate. Wiggins Report, Table 2. Similarly, Dr. Skinner argues that these three products are the "at-issue DVAA products." Skinner Report, ¶ 50 and Table 3.

<sup>126</sup> See my backup materials for details.

<sup>127</sup> GOOG-AT-MDL-001057220, at -7247.

<sup>128</sup> See, e.g., GOOG-AT-MDL-001057220, at -7248 ("Advertiser uses DoubleClick Campaign Manager (DCM) to manage spend across multiple DSPs. Some of that money might then use DoubleClick Bid Manager (DBM) [now part of DV360] to purchase inventory via Ad Exchange (AdX) to buy an ad slot managed by DoubleClick for Publishers (in which case it can be purchased via Ad Exchange or by another Network/SSP).")

affected commerce may extend beyond the Ad Tech revenues to also encompass Google's advertising on its own properties, such as YouTube, Gmail, or Search.

- (76) Figure 6 compares the booked revenue of Ad Tech products with Google's advertising revenue by segment reported in its 10-K filings. Booked revenues from Google Network Members' properties provide a useful measure for the volume of commerce likely affected directly by the conduct at issue, because they consist primarily of advertising revenues generated from ads placed on Google Network Members' properties through AdMob, AdSense, and Google Ad Manager (DoubleClick AdExchange for earlier years).<sup>129</sup> According to the company's 10-K, from December 2013 to 2023, Google generated total booked revenue of over \$224 billion from Google Network Members' properties, which is [REDACTED] more than the total revenue from its Ad Tech products reflected in the DVAA P&Ls Google has provided in discovery (as summarized in Figure 5, above). I have not been able to identify what accounts for the difference. Of even greater potential importance, however, is that Google also generated an additional \$1.2 trillion in booked revenue during the period at issue from advertising on Google websites, such as its YouTube, Gmail, and Search properties. In total, Google earned approximately \$1.4 trillion in booked revenue over the years at issue, more than seven times Google's revenue from Ad Tech products considered alone. As I discuss in Sections III.C and III.D, to the extent that Google's conduct at issue implicated the advertising on its own websites, e.g., via the use of its Ad Tech tools to direct display advertisements to YouTube or Gmail, for example, or Google Search via its other conduct at issue, the potential volume of affected commerce may be considerably larger than the Ad Tech or Google Network booked revenues alone would otherwise suggest.

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<sup>129</sup> See, e.g., Alphabet Inc., *Form 10-K 2017*, February 6, 2018, 54 and Alphabet Inc., *Form 10-K 2021*, February 2, 2022, 55.

**Figure 6: Google's Advertising Revenue by Segment, 2013–2023**

Year	Booked Revenue, DVAA (\$ million)	Booked Revenue from 10-K Filings		
		Google Network (\$ million)	Google Websites (\$ million)	Total (\$ million)
2013		\$1,138	\$3,119	\$4,256
2014		\$14,539	\$45,085	\$59,624
2015		\$15,033	\$52,357	\$67,390
2016		\$15,598	\$63,785	\$79,383
2017		\$17,616	\$77,961	\$95,577
2018		\$20,010	\$96,451	\$116,461
2019		\$21,547	\$113,264	\$134,811
2020		\$23,090	\$123,834	\$146,924
2021		\$31,701	\$177,796	\$209,497
2022		\$32,780	\$191,693	\$224,473
2023		\$31,312	\$206,543	\$237,855
<b>Total</b>		<b>\$224,364</b>	<b>\$1,151,888</b>	<b>\$1,376,251</b>

Source: Andrien Report backup for Exhibit 2 (2013–2021). Skinner report backup for Table 4B (2022–2023). Alphabet Inc., Form 10-K filings, 2015–2023.

Notes: [1] Booked Revenue for Ad Tech Includes AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

[2] Booked Revenue from 10-K Filings for Google Network consists primarily of advertising revenues generated from ads placed on Google Network Members properties through AdMob, AdSense, and Google Ad Manager (DoubleClick AdExchange for earlier years).

[3] Since the earliest start date for a DTPA claim is November 11, 2013, for Bernanke, 2013 line items equal the value of the source P&L line items multiplied by 1/12.

- (77) Figure 7 compares the operating profit of Google's Ad Tech products with Google's total advertising operating profits and its estimated operating profit by segment. Note that I have estimated the operating profits listed for the Google Network and Google Websites, since Google does not report profits separately for these segments on its 10-Ks.<sup>130</sup> From December 2013 to 2023, Google generated \$517 billion in total operating profit from advertising, of which, as reported below, [REDACTED], and \$506 billion is from Google Websites. While Google appears to use some of its Ad Tech products to advertise on its own websites, from my review of the available financials, [REDACTED]

<sup>130</sup> I estimate Google's operating profit from Google Network properties by scaling up the operating profit from its Ad Tech products using the revenue ratios shown in Figure 6. This approach may overstate the amount of operating losses in some of the earlier years for Google Network, and thus understate the total amount Google Network operating profits, since there are substantially more revenues for Google Network during those years than is recorded for DVAA; and it is unclear what, if any, additional expenses may be associated with those additional revenues, and whether the amount of such additional expenses exceeded the additional revenues.



**Figure 7: Google's Advertising Operating Profit by Segment, 2013–2023**

Source: Andrien Report backup for Exhibit 2 (2013–2021). Skinner report backup for Table 4B (2022–2023). Alphabet Inc., Form 10-K filings, 2015-2023. S&P Capital IQ.

Notes: [1] Operating Profit for Ad Tech Includes AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

[2] Google Advertising Operating Profit from Google Network is estimated using the annual Ad Tech Operating Profit multiplied by (2013–2023 Booked Revenue of Google Network Members' properties / 2013–2023 Booked Revenue of Google DVAA products).

[3] Total Google Advertising Operating Profit is estimated as the total Operating Income Before Tax for Google, Google Cloud, and Google Services from S&P Capital IQ.

[4] Advertising Operating Profit from Google Websites is estimated as total Operating Profit from Google Advertising minus Total Operating Profit from Google Network.

[5] Since the earliest start date for a DTPA claim is November 11, 2013 for Bernanke, 2013 line items equal the value of the source P&L line items multiplied by 1/12.

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not identify the portion of that volume of commerce associated with the Plaintiff States. Performing such an allocation for purposes of evaluating or deriving a statutory penalty amount, however, is complicated due to several conceptual issues. There are many parties involved in, and affected by, the display advertising in the auctions in which Google's Ad Tech products are used, i.e., publishers, advertisers, and consumers, as well as Google itself, including Google equipment (servers), facilities, and people. Thus, there are multiple, overlapping, and alternative pathways in which Google's revenues and profits associated with its Ad Tech products could be allocated to the Plaintiff States in this context.<sup>131</sup> For example, for a given AdX transaction, the transaction or revenues may pertain to: advertisers or advertising agencies located within the Plaintiff States; publishers or their advertising agencies within those states; individuals (whether as consumers or as employees of businesses) who see the advertisements, and whose data are used in the advertising algorithms to generate additional revenues for Google, the publishers, and the advertisers; or Google itself, via the servers on which either the auctions themselves are transacted, on which the data used in the transactions are stored, or via other data processing and storage mechanisms. Thus, an appropriate allocation of the affected commerce to Plaintiff States for purposes of applying the relevant statutes may result in a far greater amount of transactions, revenues, or profits than an allocation performed for other purposes, such as an allocation for state tax purposes. Because of the number of Plaintiff States, I expect a relatively large fraction of U.S. transactions would likely be related to the Plaintiff States through at least one of the channels mentioned above. If that is the case, Mr. Andrien's allocations to the Plaintiff States in his Table 1 will significantly understate the commerce at issue associated with the Plaintiff States. Nonetheless, as a lower bound, I adopt Mr. Andrien's approach below.

- (79) Figure 8, below, shows the allocation of Google's revenues from potentially affected products to the Plaintiff States, following Mr. Andrien's allocation methodology.<sup>132</sup> The first columns shows that the total booked revenue from Google's Ad Tech products associated with the Plaintiff States is [REDACTED] for 2013–2023.<sup>133</sup> As I describe above and show in Figure 6, the potentially affected volume of commerce could be captured in the advertising revenues from Google Network Members' properties or Google Websites. Using Mr. Andrien's methodology, the total revenues associated with the Plaintiff States would be [REDACTED] for Google Network Members' properties, [REDACTED] for Google Websites, and \$189.7 billion for Google's advertising business as a whole.

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<sup>131</sup> Dr. Wiggins recognizes that the Plaintiff States can be affected by Google's alleged conduct in multiple, overlapping ways, but only uses the location of advertisers in his allocation of affected transactions to the Plaintiff States. Wiggins Report, § IV.D.

<sup>132</sup> Andrien report, ¶¶ 94–95 and Table 1.

<sup>133</sup> These columns correspond to Table 1 in Andrien report except 2022–2023, where I use Dr. Skinner's corrected P&L metrics.

**Figure 8: Estimated Google revenue by segment associated with Plaintiff States, 2013–2023**

Year	Booked Revenue, DVAA (\$ million) <sup>1</sup>	Google Advertising Revenue		
		Google Network (\$ million) <sup>2</sup>	Google Websites (\$ million) <sup>4</sup>	Total (\$ million) <sup>3</sup>
2013				\$540
2014				\$7,337
2015				\$8,819
2016				\$10,773
2017				\$13,038
2018				\$15,653
2019				\$18,295
2020				\$19,966
2021				\$29,254
2022				\$32,061
2023				\$33,918
<b>Total</b>				<b>\$189,653</b>

Source: Andrien Report, backup for Table 1, Exhibit 2. Skinner backup for Table 4B. Alphabet Inc., Form 10-K filings, 2015–2023. S&P Capital IQ.

Notes: [1] Booked Revenue for Ad Tech is estimated following Andrien's approach for Table 1, replacing 2022–2023 revenues with Skinner's backup for Table 4B. It includes AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

[2] Google Advertising revenue from Google Network is estimated using the annual Ad Tech Booked Revenue multiplied by (2013–2023 Booked Revenue of Google Network Members' properties / 2013–2023 Booked Revenue of Google DVAA products).

[3] For a given year, total Google Advertising Revenue is estimated as Google's worldwide advertising revenues from 10-K filings \* (% of Google's revenues in the U.S.) \* % of U.S. internet subscribers in the Plaintiff States using Andrien backup for Table 1.

[4] Advertising Revenue from Google Websites is estimated as total Google advertising revenue minus total advertising revenue from Google Network.

[5] Since the earliest start date for a DTPA claim is November 11, 2013, for Bernanke, 2013 line items equal the value of the source P&L line items multiplied by 1/12.

- (80) Figure 9 shows the allocation of Google's operating profit from potentially affected products associated with the Plaintiff States, following Mr. Andrien's methodology. The total operating profits from Google's Ad Tech products associated with the Plaintiff States are estimated to be [REDACTED] for December 2013–2023.<sup>134</sup> Using Mr. Andrien's methodology, Google's total operating profits in advertising associated with the Plaintiff States for December 2013–2023 are [REDACTED], of which [REDACTED] are from Google Network Members' properties and the remaining [REDACTED] from Google Websites.

<sup>134</sup> These columns correspond to Table 1 in Andrien report except 2022–2023, where I use Dr. Skinner's corrected P&L metrics.

**Figure 9: Estimated Google Operating Profit by segment associated with Plaintiff States, 2013–2023**

Year	Operating Profit, DVAA (\$ million) <sup>1</sup>	Google Advertising Operating Profit		
		Google Network (\$ million) <sup>2</sup>	Google Websites (\$ million) <sup>4</sup>	Total (\$ million) <sup>3</sup>
2013				\$2,064
2014				\$2,334
2015				\$3,052
2016				\$3,671
2017				\$4,427
2018				\$5,798
2019				\$6,650
2020				\$7,420
2021				\$12,307
2022				\$11,812
2023				\$13,669
<b>Total</b>				<b>\$73,203</b>

Source: Andrien backup for Table 1, Exhibit 2. Skinner backup for Table 4B. Alphabet Inc., Form 10-K filings, 2015-2023. S&P Capital IQ.

Notes: [1] Operating Profit for Ad Tech are estimated following Andrien's approach for Table 1, replacing 2022–2023 revenues with Skinner's backup for Table 4B. It includes AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

[2] Google Advertising Operating Profit from Google Network is estimated as Ad Tech Operating Profit \* (2013–2023 Booked Revenue of Google Network Members' properties / 2013–2023 Booked Revenue of Google DVAA products).

[3] For each year, total Google Advertising Operating Profit is estimated as Google's worldwide advertising operating profit (from Google Services and Google) from Capital IQ \* (% of Google's revenues in the U.S.) \* % of U.S. internet subscribers in the Plaintiff States.

[4] Google Advertising Operating Profit from Google Websites is estimated as total Google advertising Operating Profit minus total advertising Operating Profit from Google Network.

[5] Since the earliest start date for a DTPA claim is November 11, 2013 for Bernanke, 2013 line items equal the value of the source P&L line items multiplied by 1/12.

## V. Number of affected transactions and potential statutory violations

- (81) As discussed above, from an economic perspective, Dr. Wiggins takes an inappropriately narrow view of the relevant transactions that are potentially affected by the alleged conduct. Based on that overly narrow view, Dr. Wiggins concludes, “Mr. Andrien vastly overstates the number of affected transactions.”<sup>135</sup> As discussed above, in determining an appropriate deterrent amount, it is important to assess both the total number of transactions affected by the alleged conduct (“N”); and the

<sup>135</sup> Wiggins Report, § IV.H. See Wiggins Report, § IV for a detailed discussion of Dr. Wiggins's calculations.

number of potential violations under the relevant Plaintiff States' statutes ("n"). With regard to the number of violations ("n"), Dr. Wiggins fails to distinguish between the number of affected *transactions*, i.e., auctions (which are appropriately "de-duplicated" in working backwards from Google's multiple types of conduct at issue); and the number of potential statutory *violations*. Since Google implemented multiple programs in a single auction, the jury may decide that each such auction consisted of multiple violations (i.e., multiple acts of deception). Ultimately, it is up to the jury, not Dr. Wiggins, to decide whether each of the programs at issue constitutes a separate statutory violation when Google's AdX product executes a transaction; or whether each auction affected by any of Google's conduct should be considered at most one violation. In my calculations below, I show the impact on the number of violations, if the jury decides either the former or the latter is applicable. Furthermore, as in the above discussion regarding an evaluation of the scope of the conduct at issue, while it is important identify the number of potential statutory violations, it is also relevant to consider the full extent of Google's conduct at issue (i.e., "N"), as that full extent is what likely reflects the total benefits to Google and harm to others. That assessment, in turn, helps to inform an analysis of the appropriate deterrent amount. In this section, I provide estimates of both of these measures of the extent of Google's content.

## **V.A. Dr. Wiggins's methodology for calculating the number of affected transactions is based on incorrect assumptions**

- (82) Dr. Wiggins argues that the number of transactions affected by Google's alleged conduct is 579 billion. In this section, I summarize the methodology he uses to arrive at this estimate, and I describe the flaws in this methodology.
- (83) Mr. Andrien estimates a total of [REDACTED] affected transactions associated with Plaintiff States by calculating the ratio of each Plaintiff State's internet population to that of the United States as a whole; and then applying that ratio to the total number of open auction transactions during the period at issue (December 2013 through May 2024).<sup>136</sup> Dr. Wiggins arrives at his estimate of 579 billion by applying seven "corrections" to Mr. Andrien's estimated number of affected transactions.<sup>137</sup> His calculation is inappropriate when determining the number of affected transactions for two reasons. First, while it is appropriate to restrict the transaction counts to the Plaintiff States for purposes of deriving the number of statutory violations, to derive the total number of affected transactions, he ignores the global scope of the conduct ("N"), which is relevant in assessing the overall severity and extent of the conduct, and in deriving an appropriate deterrent penalty. Second, several of his "corrections" ignore the interconnectedness of Google's Ad Tech ecosystem (also

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<sup>136</sup> Andrien Report, ¶ 97, ¶ 99, and Table 2.

<sup>137</sup> Wiggins Report, Table 1.

discussed above) and assume that the impact of Google's alleged conduct is isolated to selected products.

- (84) Dr. Wiggins makes two "corrections" in particular that inappropriately reduce the number of transactions in his calculations: his "correction 2," which excludes in-app transactions; and his "correction 7," which overly narrows the range of potentially affected transactions. Removing these two "corrections" results in a lower-bound estimate of the number of transactions impacted by the alleged deception in the Plaintiff States, although it does not necessarily provide a number of potential violations in those states (since many transactions involve multiple conduct at issue).
- (85) Dr. Wiggins's "correction 2" excludes in-app transactions in his transaction counts. Although Dr. Wiggins cites to Mr. Andrien's report in defense of this decision, he does not provide any evidence that Google's conduct at issue did not occur on mobile apps.<sup>138</sup> It is my understanding that AdX is also used for in-app advertisements.<sup>139</sup> Google's internal documents also suggest that in-app transactions were targeted by the conduct at issue.<sup>140</sup>
- (86) Dr. Wiggins's "correction 7" limits the transaction count by identifying types of transactions that he claims were unaffected by the alleged deception.<sup>141</sup> As noted in Section III, however, Google's Ad Tech products operate within a highly integrated and cohesive "ecosystem," which means that when transactions are impacted by Google's conduct in one part of that ecosystem, it is likely that many other, if not all, transactions will be at least indirectly affected. Therefore, Dr. Wiggins's claim that only some of the transactions were affected cannot be assumed to be true.
- (87) I also provide an alternative version of transaction counts by relying on Mr. Andrien's penalty period, which Dr. Wiggins's modifies in his "correction 5." By focusing on these three corrections, I am not accepting Dr. Wiggins's other four corrections but rather providing a lower bound of the number of potentially affected transactions.

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<sup>138</sup> Wiggins Report, § IV.B. "Compare Ad Manager, AdSense, and AdMob," *Google Support*, accessed August 21, 2024, <https://support.google.com/admanager/answer/9234653?hl=en>.

<sup>139</sup> "Compare Ad Manager, AdSense, and AdMob," *Google Support*, accessed August 21, 2024, <https://support.google.com/admanager/answer/9234653?hl=en>.

<sup>140</sup> An internal email chain from April 2017 discusses the plan to "roll out Regular Bernanke on AdMob" and states that "[w]e are roughly targeting end of August." GOOG-NE-07249237, at -9237. A 2019 employee performance review document confirms that Bernanke was implemented on AdMob: "Bernanke originally applied to the special case of one buyer (AdWords) bidding on one seller (AdX)...In 2018 I led projects to extend Bernanke to work on Gmob (app install) buyers and AdMob (Google's mobile app publisher) sellers." GOOG-DOJ-AT-02218994, at -8996.

<sup>141</sup> Wiggins Report, § IV.G.

## V.B. Corrections to Dr. Wiggins's estimates of affected transactions and potential statutory violations

- (88) To understand the full scope of Google's conduct at issue (i.e., "N," as defined above), I first calculate the overall number of AdX open auction transactions that are potentially impacted in Figure 10 below. It shows that Google's alleged conduct affects almost all AdX global open auction transactions after correcting for Dr. Wiggins's inappropriate modifications. Expanding Dr. Wiggins's transaction counts to include all global transactions (i.e., by undoing his "corrections" 1, 3, 4, and 6) results in over ████████ transactions, or ██████ of global AdX transactions over the course of his defined penalty period.<sup>142,143</sup> Additional adjustments to include in-app transactions increase the number and percentage of potentially affected transactions to ████████ and ██████ respectively; and further accounting for the entire Ad Tech ecosystem increase these further to ████████, or ██████ of all AdX transactions in Dr. Wiggins's proposed penalty period. When using Mr. Andrien's conduct period, the count of potentially affected transactions increases to ████████, or ██████ of all AdX transactions in that period.

**Figure 10: Global AdX open auction transactions potentially affected by Google's conduct at issue during the Wiggins conduct period**

Transactions included	"De-duplicated" transaction counts	Percent of global transactions
Dr. Wiggins's proposed global transaction count	██████████	██████
Excluding "correction" 2	██████████	██████
Excluding "corrections" 2 and 7	██████████	██████
Excluding "corrections" 2, 7, and 5	██████████	██████

Source: Wiggins Report backup for Table 1.

Notes:

[1] Dr. Wiggins's proposed global transaction count is the number of worldwide AdX open auction transactions, limited to (1) web transactions, (2) transactions in his proposed corrected time period, and (3) potentially affected transactions.

[2] No restrictions have been made to account for the plaintiff states' relative share of transactions. This includes limitations to account for (1) states that can recover B2B civil penalties, (2) corrections using the location of the advertiser, or (3) the plaintiff states' statutes of limitations.

[3] Percent of global transactions is the number of de-duplicated transactions divided by the total number of AdX open auction transactions between the onset of the earliest deceptive program and end of the latest deceptive program. The first three sets of transactions included rely on Dr. Wiggins's modified penalty period. The transaction counts for "Excluding corrections 2, 7, and 5" relies on Mr. Andrien's conduct period and contain more total global transactions than the other scenarios.

- (89) As I describe in Section I, the total number of transactions potentially or actually affected by the conduct at issue ("N") provides one measure of its overall severity, while the number of actionable

<sup>142</sup> Dr. Wiggins's "correction 1" limits the transactions to U.S. AdX transactions. Correction 3 limits the count of transactions to states that can recover civil business-to-business penalties. Correction 4 relies on the location of advertisers to calculate the Plaintiff states' share of transactions. Correction 6 limits the transaction count by accounting for the states' statutes of limitations. All four of these corrections are not relevant when considering the global number of transactions impacted by the deceptive programs. Wiggins Report, § IV.

<sup>143</sup> Penalty period defined using Dr. Wiggins's modified penalty period. See Wiggins Report, § IV.E.

transactions within each of the Plaintiff States with per violation statutory violations (“n”) may impose a limit on the amount of the statutory penalties that the Plaintiff States can impose. In the discussion below, I show that Dr. Wiggins’s estimates of actionable transactions in the Plaintiff States understate the severity and extent of harm from Google’s alleged conduct.

- (90) Throughout the analysis below, I incorporate Dr. Wiggins’s “correction 3” (limiting the number to those states that can recover civil penalties for business-to-business transactions), “correction 4” (changing the percentage allocated to Plaintiff States to account for locations of advertisers), and “correction 6” (accounting for each Plaintiff States’ statutes of limitations).<sup>144</sup> “Correction 3” and “correction 4”, when applied individually, lead to a reduction in de-duplicated transaction counts from Mr. Andrien’s estimate of 84.0% and 30.7% respectively.<sup>145</sup> Whether the Plaintiff States have a right to assess penalties for the conduct in the transactions Dr. Wiggins excluded based on his corrections 3 and 6 is ultimately a legal matter, but these transactions are still relevant in assessing the extent of the conduct in the Plaintiff States and thus in a deterrence analysis.
- (91) Figure 11 shows that excluding Dr. Wiggins’s “corrections” 2 and 7, i.e., including in-app transactions and accounting for the entire Ad Tech ecosystem, increases the lower-bound count of AdX transactions in the Plaintiff States to over [REDACTED]. For purposes of assessing penalties, however, the relevant measure is the number of statutory violations in the Plaintiff States, and the jury may decide that Google’s conduct resulted in multiple violations in a single transaction. Excluding these two “corrections” by Dr. Wiggins would result in a lower bound count of [REDACTED] affected transactions, and a lower-bound count of [REDACTED] potential violations in the Plaintiff States during Dr. Wiggins’s proposed penalty period. Additionally, if the jury were to decide that Mr. Andrien’s conduct period were appropriate, the lower-bound count of affected transactions in the Plaintiff States increases to [REDACTED], and the lower-bound count of potential violations in the Plaintiff States increases to [REDACTED].

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<sup>144</sup> See Wiggins Report, § IV.

<sup>145</sup> Wiggins Report, Table 1.



**Figure 11: Modifications to Dr. Wiggins's proposed AdX open auction transaction count in the Plaintiff States**

Transactions included	De-duplicated transaction counts	Violation counts
Dr. Wiggins's proposed transaction count	██████████	██████████
Excluding "correction" 2	██████████	██████████
Excluding "corrections" 2 and 7	██████████	██████████
Excluding "corrections" 2, 7, and 5	██████████	██████████

Source: Wiggins Report backup for Table 1.

Notes:

[1] Dr. Wiggins's proposed transaction count is his reported number of AdX open auction transactions impacting the Plaintiff States, according to his seven corrections. See Wiggins Report, Section IV.

[2] Violation counts represent the number of unique violations, whereas de-duplicated transaction counts represent the number of unique transactions. For example, if there were 500 total transactions in a month where two deceptive programs were active, there would be 500 de-duplicated transactions and 1,000 violations.

- (92) As I describe in Sections III and IV, the volume of commerce impacted by the conduct could include much more than the Ad Tech products directly affected by the alleged conduct. Dr. Wiggins's transaction counts are limited to AdX transactions, but as discussed above, there are non-AdX transactions that were likely impacted by the deception, such as those occurring through the Google Display Network. Moreover, the conduct at issue likely also affected Google's advertising revenues and profits on Google Search, and other products that use AdWords, which would increase substantially the number of affected transactions. Lastly, as Dr. Weinberg explains, Google's conduct enabled it to accumulate additional data on users, advertisers, and publishers, which allowed Google to optimize its algorithms to increase ad targeting and personalization, and thus increase revenue across all its businesses.<sup>146</sup>
- (93) In assessing even these exceptionally large numbers of affected transactions or potential violations, it should be noted that any allocation of the affected transactions to a particular state's jurisdiction is complicated due to several conceptual issues, as raised above in the discussion of the allocation of revenues and profits to the Plaintiff States. In deriving what he considers to be the number of affected transactions in the Plaintiff States (which he uses in calculating his proposed penalty amounts of between \$44.9 million and \$141.3 million), Dr. Wiggins only considers the billing address of advertisers in his allocation of affected transactions associated with the Plaintiff States.<sup>147</sup> However, there are many parties involved in, and affected by, the display advertising in the auctions in which Google's Ad Tech products are used: publishers, advertisers, consumers, and Google itself. A transaction for advertising space appearing on the Dallas Morning News (the publisher) could be reasonably considered a transaction allocable to Texas for penalty purposes; as could a transaction involving an advertisement for Coke (for a Georgia-based advertiser) on the Chicago Tribune's

<sup>146</sup> Chandler Report, ¶ 284.

<sup>147</sup> Wiggins Report, ¶ 128.



website when viewed by Texas resident; or a transaction involving an advertisement by a Houston car dealership; or transactions involving non-Texas parties on Google's servers located in Texas that are running the auctions using the programs at issue or storing the data used in those programs. Thus, there are multiple, alternative pathways by which each transaction associated with its Ad Tech products could be allocated to the Plaintiff States in this context. Thus, any single exclusive allocation method of the affected transactions to Plaintiff States for purposes of applying the relevant statutes, such as the method used by Dr. Wiggins, will understate, and likely substantially underestimate, the number of relevant transactions and violations within the Plaintiff States.

- (94) Regardless of whether Mr. Andrien's initial estimates of the number of statutory violations ("n") are correct, or Dr. Wiggins's corrections of Mr. Andrien's numbers are correct, or my corrections of Dr. Wiggins's numbers are correct, from the perspective of determining the appropriate deterrence penalty, the overall conclusion would be the same: the number of statutory violations is so large, even if one were to accept Dr. Wiggins's estimate of 579 billion, that we are effectively in the flat part of the aggregate penalty curve discussed above in Figure 1. Furthermore, the broad scope of the conduct at issue in terms of the total number of auctions affected, over a period of many years, with multiple overlapping instances of different conduct, and accounting for a substantial fraction of all programmatic advertising, all points to the need for a substantial deterrent penalty amount, far above the minimal amounts proposed by Dr. Wiggins.

## **VI. Penalties necessary for deterrence are far above the amounts suggested by Dr. Wiggins**

### **VI.A. Dr. Wiggins's estimate of Google's benefits from the conduct is unreliable**

- (95) Dr. Wiggins proposes three penalty estimates based on Google's alleged conduct, ranging from \$21.7 million to \$141.3 million.<sup>148</sup> Ultimately, however, Dr. Wiggins concludes "that none of the alleged deception in this case generated incremental profits for Google, and thus that the appropriate DTPA civil penalty based on Mr. Andrien's framework is zero."<sup>149</sup> All three estimates reflect a narrow view of how Google's alleged conduct affects the Ad Tech ecosystem and other entities in the marketplace. Dr. Wiggins derives two of his estimates, \$44.9 million and \$141.3 million, by applying his revised per-violation penalty amount of \$0.000078 to a narrow set of transactions within Google's Ad Tech products, to which Dr. Wiggins assumes the impact of Google's conduct is

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<sup>148</sup> Wiggins Report, Figure 6.

<sup>149</sup> Wiggins Report, ¶ 19.

limited.<sup>150</sup> I describe the flaws in his estimated count of affected transactions and the number of potential statutory violations in Section V above, and note that Dr. Wiggins's per-violation penalty contains an inconsistency in the assumed scope of harm.<sup>151</sup> Even setting aside these issues, the penalty amounts Dr. Wiggins derives focus only on the benefits Google derived from a subset of the affected transactions in the Plaintiff States (under the various limitations he imposes). As discussed above, however, to derive an estimate of an appropriate deterrent penalty amount, as a starting point, the appropriate measure of benefits is Google's total benefits from the conduct; which one then needs to divide by the probability of detection, enforcement, and penalty collection. Thus, even if Dr. Wiggins's calculations were reliable (which they are not), they are insufficient for determining an appropriate deterrent penalty amount.

- (96) The lowest of the three penalty amounts that Dr. Wiggins estimates, \$21.7 million, is also based on flawed assumptions of the channels, scope, and extent of harm from Google's alleged conduct.<sup>152</sup> In terms of channels of harm, Dr. Wiggins estimates Google's incremental profits from the alleged conduct only through its impact on AdX clearing prices but does not estimate any additional profits for Google from retaining publishers or raising the equilibrium price (take rate) due to its competitive advantage. In addition to a "price effect," Dr. Wiggins acknowledges a "quantity effect" of the alleged conduct, i.e., more auctions cleared on AdX than otherwise would have cleared, but-for the alleged conduct.<sup>153</sup> However, he only estimates the quantity effect for one of the deceptive practices—DRS v2.<sup>154</sup> Regarding scope, Dr. Wiggins assumes Google only gained profits through the alleged conduct from transactions won by DV360, Authorized Buyers, and Google Ads.<sup>155</sup> This assumption ignores the indirect impact of Google's alleged conduct throughout the Ad Tech ecosystem. Furthermore, Dr. Wiggins estimates the amount of bid shading ("shading factor") based on the results from a Google experiment that was not conducted to study the impact of any of the alleged deceptive practices.<sup>156</sup> Since the shading factor scales Google's incremental profits, understating its magnitude would underestimate Google's incremental profits from the alleged conduct. Dr. Weinberg, in his rebuttal

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<sup>150</sup> The restrictions to the set of affected transactions are described in Wiggins Report, § IV. See discussion above regarding the flaws in these restrictions.

<sup>151</sup> Dr. Wiggins's estimated net revenues and total number of transactions are limited to three products (AdX, Google Ads, and DV 360), but "Google's Profit Rate" comes from Google's Display Advertising P&L file for a much broader set of Ad Tech products. Wiggins Report, Table 2.

<sup>152</sup> Wiggins Report, Appendix D.

<sup>153</sup> Wiggins Report, ¶ 104.

<sup>154</sup> Wiggins Report, Appendix D.2.

<sup>155</sup> Wiggins Report, ¶¶ 288–300.

<sup>156</sup> Wiggins Report, ¶¶ 292–295. For an overview of the Project Poirot where Dr. Wiggins adopts an input for the "shading factor," see GOOG-NE-11275306 at -5306 and GOOG-NE-05279911, at -9917.

report, describes the flaws in Dr. Wiggins's estimate of bid shading and how Dr. Wiggins's estimate of the "shading factor" could be understating the magnitude of shading in the conduct at-issue.<sup>157</sup>

- (97) Finally, Dr. Wiggins's claim that Google made no incremental profits from the alleged deception relies on his assertion that publisher and advertiser learning is inconsistent with Plaintiffs' claims about the harm from the alleged conduct (and associated higher profits for Google).<sup>158</sup> This assertion is contradicted by the economic literature and the documents in this case. The academic literature describes the difficulties in measuring advertiser return on investment, highlighting challenges in establishing causality.<sup>159</sup> Internal documents from Google also acknowledge that advertisers find it difficult to understand the drivers of returns to advertising spending and how auction mechanisms affect these returns.<sup>160</sup> More fundamentally, Dr. Wiggins's paradoxical claim rests on the assumption that Google, which according to Dr. Wiggins behaves so as to maximize profits,<sup>161</sup> is investing in the programs at issue without profiting from them. As I discuss below, this assertion is contradicted by Google's own estimates of the substantial additional revenue it derives from these programs. It also runs contrary to Dr. Wiggins's own assertions regarding Google's basic profit motive.
- (98) As previously discussed, Dr. Wiggins's claims that Mr. Andrien's "estimated DTPA civil penalties are grossly overstated" and that "Mr. Andrien proposes wildly disproportionate DTPA civil penalties"<sup>162</sup> are based on flawed economic assumptions about the scope of the conduct, the affected transactions, and consumer harm. He also ignores the purpose of the statutory penalties at issue, and particularly their deterrent purpose, as well as a wide range of other factors for the jury to consider that are specified in the relevant statutes. In Section II, above, I outline the economic framework for determining monetary penalties with a view to deterrence. From an economic perspective, calculating the penalty required for deterrence requires two inputs: the estimated total gains to Google from the alleged conduct; and an estimated probability of detection for such conduct. In the remainder of this section, I discuss Google's own estimates for the aggregate effects

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<sup>157</sup> Weinberg Rebuttal Report, § IV.E.

<sup>158</sup> Wiggins Report, §§ II.B and VII, and specifically Wiggins Report, ¶¶ 185, 188, 207–209, 216–218, 222, 228, 231, and 241.

<sup>159</sup> See, e.g., Randall Lewis, Justin M. Rao, and David H. Reiley, "Measuring the Effects of Advertising: The Digital Frontier," in *Economic Analysis of the Digital Economy*, ed. Avi Goldfarb, Shane M. Greenstein, and Catherine E. Tucker (Chicago: University of Chicago Press, 2015).

<sup>160</sup> A Google document on "June 2018 Auction Tuning" states that advertisers tend to attribute changes in ROI to changes in the world instead of Google's backend auction mechanisms: "A large fraction of advertisers see large swings in core monitoring metrics like CPC, Clicks, Conversion, Impressions over time. They often attribute these changes to things in the world or what they've done, not just things happening on the backend and are mostly satisfied in their ability to take action." GOOG-NE-05047199, at -7202. A 2017 Google document acknowledges that cross channel ROI comparisons are difficult. GOOG-AT-MDL-019569093, at -9094. Another Google document states that "[a]dvertisers do care about the incrementality of their advertising spend, but it is difficult to measure." GOOG-NE-10804189, at -4199.

<sup>161</sup> See, e.g., Wiggins Report, ¶ 278.

<sup>162</sup> Wiggins Report, §§ VI and VII.

of its deceptive practices on revenue, thus incorporating both price effects and quantity effects. I also discuss a reasonable range of estimates for the probability of detection. Based on this information, I derive estimates of deterrent penalties that are consistent with, and even considerably higher than, Mr. Andrien's proposed penalty range, which Dr. Wiggins incorrectly claims to be "wildly disproportionate."<sup>163</sup>

## VI.B. Google documents show it earned substantial benefits from the conduct

- (99) As noted above in the discussion of the economic literature, there are two ways to begin quantifying the appropriate deterrent amount: (i.) based on the aggregate harm caused by the conduct; or (ii.) based on the aggregate benefits obtained by Google. As discussed above, the scope of harm associated with the conduct indicates that the magnitude of the harm – including the conduct's effect on publishers, advertisers, Google's limited number of competitors, and ultimately consumers – likely exceeds the benefits to Google. The magnitude of that harm, however, is difficult to quantify with any degree of precision. Thus, I focus my attention here on the magnitude of benefits that Google likely obtained from the conduct, which provides a lower bound input for estimating the appropriate deterrent amount (after adjusting for the probability of detection, enforcement, and penalty collection). In addition, while the incremental revenues earned by Google from the conduct at issue may not provide a measure of the *net* benefits obtained by Google (particularly if the incremental revenues are based on booked revenue, rather than net revenue), they may be a general indicator of the potential order of magnitude of the aggregate harm caused by the conduct at issue. This is because incremental revenues, whether measured in terms of booked revenue or net revenue, represent some combination of increased prices paid by advertisers, increased volumes of transactions, increased take rates by Google, and foregone revenues to competitors.
- (100) From an economic perspective, in evaluating benefits, one can examine either expected benefits or actual benefits. From a theoretical perspective, the former are likely to be more informative than the latter in determining a deterrent amount; from a practical perspective, however, actual benefits are also informative, since they can reduce the uncertainty associated with estimating various parameters on an *ex ante* basis. I have reviewed documents in which Google employees discuss the expected increase in Google's annual revenues as a result of the conduct at issue. One such document is a presentation titled "Discussion on improving AdX & AdSense backfill," which states that Bernanke added [REDACTED] queries and increased revenue by [REDACTED].<sup>164</sup> Another such

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<sup>163</sup> Wiggins Report, § VII.

<sup>164</sup> GOOG-NE-03872763 at -2781.

document is an August 2015 presentation titled “Beyond Bernanke”<sup>165</sup> prepared by an engineer on the [REDACTED] team.<sup>166</sup> The presentation contains a summary of results concerning an experiment conducted by Google to determine the impact of the Bernanke project.<sup>167</sup> These results are sourced from “RASTA,”<sup>168</sup> an experiment-related infrastructure system that Google operates.<sup>169</sup> The document presents comparisons between data generated under the “Bernanke::No\_Bernanke” scenario, which does not include the Bernanke program adjustments, and the “Bernanke::Control” scenario, which includes the adjustments.<sup>170</sup> The summary indicates that as a result of the Bernanke program, there was a [REDACTED] increase in “matched queries,” in which an AdWords buyer won the auction relative to all AdX queries.<sup>171</sup> Additionally, there was a [REDACTED] decline in “matched queries” for non-Google buyers, and a [REDACTED] increase for AdWords buyers specifically.<sup>172</sup> The presentation estimates that the Bernanke program was responsible for approximately [REDACTED] in additional revenue per year for GDN (Google Display Network).<sup>173</sup>

- (101) I have also reviewed documents that discuss and quantify the expected revenue increases attributable to the RPO<sup>174</sup> and DRS<sup>175</sup> programs. One such document is an October 31, 2015, email written by Google engineer [REDACTED],<sup>176</sup> who writes that, “The New RPO is increasing revenue from [REDACTED] generating a network-wide (adx+adsense pubs) revenue lift of [REDACTED] over the

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<sup>165</sup> GOOG-DOJ-28385887.

<sup>166</sup> Deposition of Nirmal Jayaram (“Jayaram Depo.”), July 10, 2024, 180:17-25.

<sup>167</sup> The Bernanke program was implemented based on Google’s observation that in auctions won by GDN advertisers, GDN submitted the second highest bid 80% of the time. Therefore, GDN would benefit by minimizing the amount of the second highest bid, which would then lower the payment necessary to win the impression. The savings generated by lowering the amount of the second highest bid were used to subsidize overbidding by GDN advertisers. See Weinberg Report, § VIII.

<sup>168</sup> GOOG-DOJ-28385887 at -5895.

<sup>169</sup> Deposition of Nitish Korula (“Korula Depo.”), May 3, 2024, 567:12-17.

<sup>170</sup> Jayaram Depo., 182:15-24.

<sup>171</sup> Jayaram Depo., 183:3-184:9.

<sup>172</sup> Jayaram Depo., 185:9-186:16.

<sup>173</sup> GOOG-DOJ-28385887 at -5895 and -5907.

<sup>174</sup> The RPO program involved AdX calculating reserve prices for each buyer such that these prices would maximize AdX revenue. AdX would then use these prices in place of the reserve price actually set by the publisher. Publishers did not have the option to opt out of the RPO program, which was originally launched silently. See Weinberg Report, § IX.

<sup>175</sup> The DRS program involved AdX dynamically decreasing its take rate below 20% to win impressions it would have lost had the take rate remained at 20%. Under the DRS program, if the second highest bid exceeded the reserve price of the ad server but was not high enough to generate a 20% take rate for AdX, AdX would take the difference between the highest bid and the reserve as its fee and pass the reserve to the publisher. In this instance, AdX’s fee is necessarily less than 20%. This procedure was updated in DRSv2, which allowed AdX to increase the take rate above 20%, which served to balance the lower fee it charged when reducing its take rate below 20% in other auctions. See Weinberg Report, § VII.

<sup>176</sup> “[REDACTED]”  
[REDACTED]

past week according to RASTA. That works out to about [REDACTED] in annual incremental revenue.”<sup>177</sup> This estimate was corroborated by the meeting notes of the “DRX Suite Commercialization” team<sup>178</sup> and a November 2015 email<sup>179</sup> from [REDACTED], then a Google product manager.<sup>180</sup> A March 2016 brief raised this estimate to [REDACTED].<sup>181</sup> Similarly, an internal Google email exchange dated one week after the launch of DRS stated that DRS was responsible for an additional [REDACTED] of annual AdX revenue.<sup>182</sup> Google employees later revised this estimate, stating in a May 2016 presentation titled “AdX Auction Optimizations” that the “v1” variant of DRS accounted for [REDACTED] of revenue.<sup>183</sup> Later in 2016, the estimated benefit of DRS was further revised in the meeting notes of Google’s “DRS Sync” team, which state that the DRS program was responsible for approximately [REDACTED] in additional revenue per year.<sup>184</sup> In a presentation titled “Overall Pub Yield with DRS(v2),” Google employees estimated that DRS was responsible for a [REDACTED] increase in AdX revenue and a [REDACTED] increase in AdX profit.<sup>185</sup>

- (102) Based on my review of these documents, and my understanding of the conduct at issue, I expect them to reasonably reflect the actual realized and expected future benefits to Google of that conduct. I understand that the results cited in the “Beyond Bernanke” program were generated from an experiment run over a 12-hour window on August 8, 2015 and that, more generally, the estimates in the documents I reference above were based on “small traffic experiments.”<sup>186</sup> While the experiment covered a relatively short time period, I nonetheless consider the results to be significant and relevant in assessing both the expected and actual benefits expected from this program, for two reasons. First, Google employees used the estimates in their evaluation of whether a program was successful or not, despite the relatively small time period and thus sample size underlying them.<sup>187</sup> Second, the estimates were derived after the launch of the programs, thereby being based on real data rather than simulated results. Nonetheless, given that the estimates are somewhat variable

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<sup>177</sup> GOOG-AT-MDL-B-001114919.

<sup>178</sup> GOOG-AT-MDL-B-004435235 at -5280.

<sup>179</sup> GOOG-NE-04719370.

<sup>180</sup> [REDACTED]

<sup>181</sup> GOOG-DOJ-29803801 at -3802.

<sup>182</sup> GOOG-TEX-00777528 at -7530.

<sup>183</sup> GOOG-NE-06842715 at -2718.

<sup>184</sup> GOOG-DOJ-32280412 at -0447.

<sup>185</sup> GOOG-NE-13234466 at -4467.

<sup>186</sup> Deposition of Nirmal Jayaram, April 26, 2024, 139:12-19.

<sup>187</sup> For example, the slide containing the RASTA results with the [REDACTED] figure is titled “Bernanke Success.” See GOOG-DOJ-28385887 at -5895.

given the small sample size of the underlying data, I account for this by preparing numerous sensitivities of my analysis, applying different methodologies and assumptions.<sup>188</sup>

## **VI.C. The probability of detection, enforcement, and penalty collection can be reasonably estimated**

- (103) As discussed above, in addition to quantifying the expected benefits and harms from a given course of conduct, an important parameter needed to derive an appropriate deterrent penalty amount is the probability of detection, enforcement, and penalty collection. It is difficult to determine precisely the (joint) *ex ante* probability of: (i.) Google's conduct being detected; (ii.) an enforcement action being undertaken; and (iii.) a monetary penalty being assessed and collected.<sup>189</sup> For many types of conduct – and particularly, any conduct that involves deception or concealment – we will never know the full extent of that conduct, since companies and individuals generally do not volunteer that they have engaged in wrongdoing, even if they are no longer liable for that wrongdoing. Nonetheless, statistics are available that can provide reasonable estimates of the *maximum* probabilities of detection and enforcement and thus the *minimum* multiples to apply to any estimate of benefits or harms for the type of conduct at issue here. For example, one study based on a sample of the U.S. Department of Justice (“DOJ”) price fixing indictments for the period 1961–1988 estimates the probability of detection in a given year to be between 13% and 17%.<sup>190</sup> Other estimates put the overall probability of detection of a price-fixing cartel within a range of 10% and 33%, which is consistent with those observed for certain other crimes, such as burglary, automobile theft, and arson.<sup>191</sup>
- (104) These probabilities are somewhat higher than one would generally expect for the types of civil causes of action at issue in this case, given the challenges enforcement agencies often face; and an enforcement agency likely faces a considerably higher threshold for bringing an enforcement action

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<sup>188</sup> See Section VI.D for details.

<sup>189</sup> Actionable conduct will be profitable, even if a party is found to have violated a particular statute, if it is not exposed to penalties or other financial remedies for that conduct. Absent more, injunctive relief, for example, still leaves the offending party with financial gains from its past misconduct. Thus, the relevant probability in deriving a deterrent penalty is the *ex ante* (joint) probability of detection, enforcement, and penalty payment.

<sup>190</sup> Peter Bryant and E. Woodrow Eckart, “Price Fixing: The Probability of Getting Caught,” *Review of Economics and Statistics* 73, no. 3 (August 1991): 531–540.

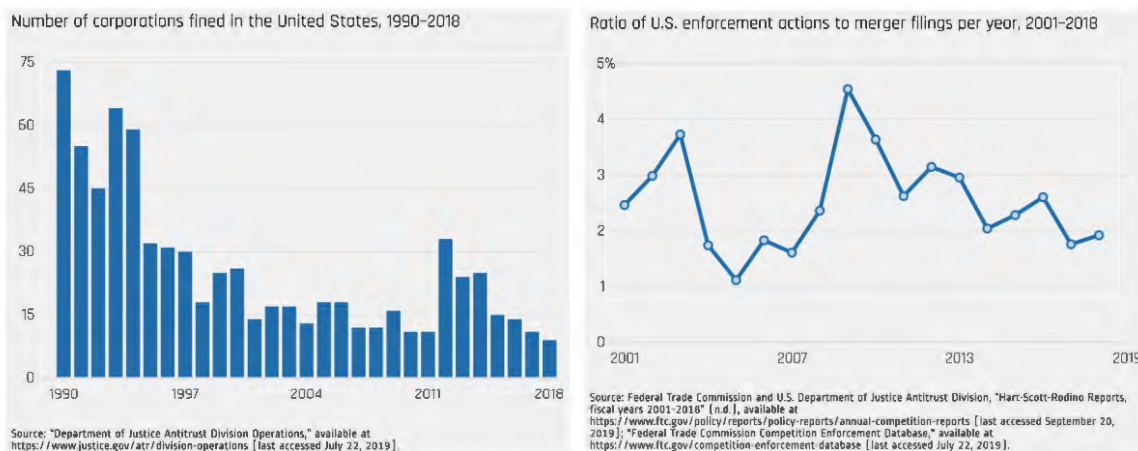
<sup>191</sup> Gregory Werden and Marilyn Simon, “Why Price Fixers Should Go To Prison,” *Antitrust Bulletin* 32, no. 4 (Winter 1997): 917–937. Based on a sample of cartel convicted by the European Union between 1969 and 2007, a study estimated the probability of detection to be between 12.9% and 13.2%. See Emmanuel Combe, Constance Monnier, and Renaud Legal, “Cartels: the Probability of Getting Caught in the European Union” (Bruges European Economic Research Papers, paper no. 12, March 2008). For detection probabilities in other crimes, see A. Mitchell Polinsky and Steven Shavell, “The Economic Theory of Public Enforcement of Law,” *Journal of Economic Literature* 38 (March 2000): 45–76, footnote 77.



for a civil, rather than a criminal violation. For instance, the U.S. Federal Drug Administration (“FDA”) monitors for violations of federal tobacco laws and regulations and works with multiple government entities for compliance and enforcement activities. However, limited resources create challenges for the FDA in accomplishing these tasks.<sup>192</sup> Similarly, the U.S. Securities and Exchange Commission (“SEC”) monitors possible violations of securities law and brings enforcement actions in several areas, such as conflict of interest disclosures by investment advisors and broker-dealers and fraudulent securities offerings. However, challenges of funding and unfilled vacancies, among other issues, hinder effective and timely detection and enforcement for that agency as well.<sup>193</sup>

- (105) Antitrust enforcement has also declined over the years. A 2019 study notes that fewer companies have been fined for antitrust violations, and the ratio of enforcement actions to merger filings has declined since 2009 (see Figure 12 below). Diminished enforcement is in line with fewer personnel and limited budgets for the U.S. DOJ and the U.S. Federal Trade Commission (“FTC”).<sup>194</sup>

**Figure 12: Antitrust enforcement actions (left) and Merger enforcement rates**



<sup>192</sup> “Combating the Youth Vaping Epidemic by Enhancing Enforcement Against Illegal E-cigarettes,” Testimony of Brian A. King before the Committee on the Judiciary, United States Senate, June 12, 2024 (“we also face several challenges such as the size and complexity of the tobacco product landscape and resources that have been flat for the last five years” p. 6) available at <https://www.fda.gov/media/179312/download?attachment>.

<sup>193</sup> The Inspector General’s Statement on the SEC’s Management and Performance Challenges, U.S. Securities and Exchange Commission, 2023, available at <https://www.sec.gov/files/inspector-general-statement-sec-mgmt-and-perf-challenges-october-2023.pdf> (it notes, “the number of TCRs [tips, complaints, and referrals] received continues to increase, which may stress the agency’s capabilities,” p. 5; “OWB [Office of the Whistleblower] was experiencing a significant backlog in processing whistleblower claims, which increased the amount of time whistleblowers waited before receiving the Commission’s Final Order,” p. 6; “the SEC faces challenges in recruiting and retaining highly skilled staff,” p. 7).

<sup>194</sup> Filippo Lancieri, Eric Posner, and Luigi Zingales, “The Political Economy of the Decline of Antitrust Enforcement in the United States,” *Antitrust Law Journal* 85, no.2 (2023): 449 (“the staff of the Federal Trade Commission has dropped by around 40% since a peak in the late 1970s. U.S. GDP grew approximately 40% since 2010, but the budget of the FTC and the DOJ Antitrust Division has remained roughly constant”).



Source: Michael Kades, "The State of U.S. Federal Antitrust Enforcement," *Washington Center for Equitable Growth* (September 17, 2019), Figure 2 and Figure 7, respectively (<https://equitablegrowth.org/research-paper/the-state-of-u-s-federal-antitrust-enforcement/>).

- (106) Antitrust enforcement is a challenge for the states, too. According to a 2020 survey of antitrust attorneys employed by state Attorneys General, most states have limited resources devoted to antitrust, with 27 states having fewer than three full-time attorneys working on antitrust enforcement.<sup>195</sup>
- (107) A 33% probability of detection, i.e., the application of three-fold multiplier to an estimate of Google's expected benefits from the conduct at issue, would be generally consistent with the automatic trebling under the antitrust laws (and certain other federal and state statutes),<sup>196</sup> which, at least in part, likely reflects that deterrence was part of the statutory construct. Some scholars, however, have concluded that automatic trebling under the federal antitrust statutes does not adequately account for the probability of deterrence (i.e., that the multiplier should be higher), as it does not account for various other factors not included in antitrust damage awards.<sup>197</sup> Additional support for the conclusion that the automatic trebling under the antitrust laws is insufficient for deterrence, and thus that the probability of detection is likely less than 33%, is the fact that while mandatory treble damages have been in place since the Sherman Act was enacted, all types of antitrust violations have continued to occur with some regularity since then, even as the number of enforcement actions has fallen in recent years (as seen in Figure above). Further evidence of the insufficiency of treble damages in deterring anticompetitive conduct is the sharp increase in the number of detected price-fixing cartels after many enforcement agencies, including the U.S. DOJ, adopted leniency programs to encourage participants in such cartels to come forward voluntarily and cooperate with enforcers in return for some measure of leniency.<sup>198</sup> The large number and percentage of cartels that were detected only after such leniency programs were implemented indicates the relatively low

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<sup>195</sup> Thurman Arnold Project, "Modern Antitrust Enforcement," Yale School of Management, available at <https://som.yale.edu/centers/thurman-arnold-project-at-yale/modern-antitrust-enforcement.27>

<sup>196</sup> See, e.g., Indiana Code § 24-5-0.5-4 (2023), which states that the court "may increase damages for a willful deceptive act in an amount that does not exceed the greater of: (1) three (3) times the actual damages of the consumer suffering the loss; or (2) one thousand dollars (\$1000)," in an action brought by "a person relying upon an uncured or incurable deceptive act;" Nevada Rev State § 598.0971 (2023), which permits the imposition of "an administrative fine of \$1,000 or treble the amount of restitution ordered, whichever is greater;" North Dakota Century Code § 51-15-09 (2023), which states that "if the court finds the defendant knowingly committed the conduct, the court may order that the person commencing the action recover up to three times the actual damages proven;" South Carolina Code § 39-5-50 (2023), which states that the court "shall award three times the actual damages sustained" in an action brought "individually" by "any person who suffers any ascertainable loss of money or property... as a result of the use... of an unfair or deceptive method;" and Texas Code § 17.50 (2023), which similarly provides for treble damages for "mental anguish." See also 15 U.S.C. § 15 (2023) and 18 U.S.C. (1964) for examples of federal laws allowing for treble damages.

<sup>197</sup> See Robert H. Lande, "Are Antitrust 'Treble' Damages Really Single Damages," 54 Ohio St. L.J. 115 (1993).

<sup>198</sup> See Joan-Ramon Borell, Carmen García, Juan Luis Jiménez, and José Manuel Ordoñez-De-Haro, "25 Years of Leniency Programs: A Turning Point in Cartel Prosecution," *CPI Antitrust Chronicle*, January 2019, pp. 6-8.

probability of detecting anticompetitive conduct in the absence of such programs; and there are no comparable leniency programs that address the type of single-firm conduct at issue in this case.

- (108) Based on the above considerations, and consistent with the literature cited above, I consider it reasonable to use a range of between 10% – 33% for the (joint) *ex ante* probability of detection, enforcement, and penalty payment in evaluating the conduct at issue in this case.

## **VI.D. The large value of Google's estimated benefits results in substantial deterrent penalties**

- (109) Based on the Google documents discussed above documenting the estimated incremental annual revenues Google was able to earn shortly after the start of the conduct, one can derive the expected total value of those benefits as of the start of the conduct at the end of 2013. I do so by assuming that Google would have reasonably expected those benefits to continue into the future. First, I estimate Google's *ex ante* expected value of the benefits at the time the conduct began, i.e., as of the end of 2013. Second, I calculate an estimate of the *ex post* realized benefits, as if those expected benefits were in fact realized through 2023, using the estimates provided by the documents, but assuming that those estimated benefits grew in line with the actual growth rates in Google's Ad Tech business. Under each approach, I first estimate the expected benefits of the Bernanke program considered alone, using two alternative estimates of incremental profits; and then I aggregate the benefits from that program with additional expected benefits from DRS and RPO. I bring the resulting present value of the benefits to Google forward to June 2025, the earliest date I assume a penalty would be paid.

### **VI.D.1. Deterrent penalties based on expected *ex ante* value to Google of the Bernanke program alone**

- (110) I first examine the Bernanke program in isolation. In my analysis, I calculate the present value of the benefits at the end of 2013, and I then bring that value forward in time to June 2025. I assume that the estimated benefits were based on current benefits and that they would have been expected to increase with the growth in Google's revenues. As a result, I perform my calculations using two alternative annual revenue growth rates: 3% and 5%. I choose 3%, as that is consistent with (and indeed, lower than) expectations of GDP growth rates as of 2013;<sup>199</sup> and I choose 5%, as that is what I consider to be a lower bound estimate of the expected growth rates of Google's Ad Tech business

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<sup>199</sup> Federal Reserve Board, "SEP: Compilation and Summary of Individual Economic Projections," June 18-19, 2013, 1, <https://www.federalreserve.gov/monetarypolicy/files/FOMC20130619SEPcompilation.pdf> (showing forecasts of longer run real GDP growth of 2% at low end of range and inflation of 2%, resulting in long-term nominal GDP growth of 4%).

as of 2013, given the prior rapid growth of the company.<sup>200</sup> Indeed, given Google's rapid growth at that time, and the expected continued growth of digital and programmatic advertising, I expect the 3% growth scenario will underestimate significantly Google's expected benefits from the Bernanke program. To convert the estimated future benefits into present value terms as of 2013, I use Google's weighted average cost of capital ("WACC") in 2013 of 9.8%.<sup>201</sup>

- (111) Because the Google documents I cite in Section VI.B state the expected benefits in terms of incremental revenues, to measure the net benefits to Google, I convert the estimated benefits to incremental profit. From an economic perspective, the appropriate measure for this calculation is not Google's operating profits, as used by Dr. Wiggins in some of his calculations,<sup>202</sup> but rather its incremental profits associated with the estimated incremental revenues. If there are no additional costs to generating the incremental revenues, the incremental revenues alone may be the appropriate measure of incremental benefits. To derive incremental profits, the question arises as to how to measure those incremental costs, i.e., based on Google's gross margins or its operating margins. I do not expect the incremental revenues generated by the conduct at issue to have generated significant incremental operating expenses, thus I use Google's gross margins from its DVAA segment to estimate a lower bound of its incremental benefits from the conduct.<sup>203</sup> I also assume that the incremental revenues estimated by Google in the relevant documents are gross bookings, not net revenue; this assumption lowers the gross margin number I use in my calculations (relative to the alternative assumption), lowering the resulting estimate of the deterrent penalty.
- (112) Figure 13 shows the results of these calculations. Based on Google's documents, as of 2013, the present value of the expected revenues of the Bernanke program would have been in the range of [REDACTED], while the present value of expected profits would have been in the range of [REDACTED] (in 2013 dollar terms). Adjusting the profit amounts by the *ex ante* probability of detection of between 33% and 10% results in deterrent amounts of [REDACTED] and [REDACTED] (again in 2013 dollars). The reason for the wide range of these estimates is due in part to the different annual growth assumptions, but mostly to the substantial differences from using a 33% versus a 10% probability of detection (i.e., a multiplier of three versus one of ten). Based on the

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<sup>200</sup> By comparison, the compound annual growth rate ("CAGR") of Google's DVAA segment booked revenues was [REDACTED] between 2013 and 2023. See my backup materials for details.

<sup>201</sup> I obtain data on Google's WACC from Bloomberg and use mid-year values, when available. Google's 9.8% WACC is dated to September 30, 2013. This is the earliest value available for 2013. See Bloomberg, "GOOGL US Equity," December 31, 2012 to August, 28, 2024.

<sup>202</sup> See, e.g., Wiggins Report, Table 2.

<sup>203</sup> Alphabet Inc., *Form 10-K 2023*, January 30, 2024, ("Our operating expenses include costs related to R&D, sales and marketing, and general and administrative functions. Certain of our costs and expenses, including those associated with the operation of our technical infrastructure as well as components of our operating expenses, are generally less variable in nature and may not correlate to changes in revenue," p. 32).

discussion above in Section VI.C, I consider the 20% probability (resulting in a multiplier of five) to provide a reasonable mid-point estimate of the appropriate deterrent amount.

**Figure 13: Deterrent penalties based on present value of incremental benefit as of end-2013 with DVAA gross margin, Bernanke in isolation (2013 dollars)**

Scenario	As of 2013				
	Incremental revenue	Incremental profit	Profit-based deterrent penalty, using probability of detection:		
			33%	20%	10%
3% annual growth					
5% annual growth					

Source: Bloomberg, GOOG-DOJ-28385887 at -5895, Andrien Report backup for Exhibit 2 (2013–2021). Skinner Report backup for Table 4B (2022–2023).

Notes: I calculate incremental profit as the product of the incremental annual revenue amount and Google DVAA's gross profit margin in the 2013-2023 period. My calculation of gross profit margin reflects AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

- (113) The analysis above provides the present value of the expected benefits of the Bernanke program alone to Google in 2013 compared to the present value of the deterrent amount, also in 2013, that would have been necessary to deter that conduct. Since the earliest the penalty would be assessed is in mid-2025 (assuming a finding of liability), I need to convert the 2013 dollar values to 2025 dollars. Here, I bring the penalty amount forward to 2025, using Google's actual WACC for each of the intervening years (and an estimate for 2025). As shown in Figure 14, this results in deterrent penalty amounts of between [REDACTED] in 2025 dollars, depending on the expected growth rate and probability of detection.

**Figure 14: Deterrent penalties based on present value of incremental benefit as of June 2025 with DVAA gross margin, Bernanke in isolation (2025 dollars)**

Scenario	As of 2025				
	Incremental revenue	Incremental profit	Profit-based deterrent penalty, using probability of detection:		
			33%	20%	10%
3% annual growth					
5% annual growth					

Source: Bloomberg, GOOG-DOJ-28385887 at -5895, Andrien Report backup for Exhibit 2 (2013–2021). Skinner Report backup for Table 4B (2022–2023).

Notes: I calculate incremental profit as the product of the incremental annual revenue amount and Google DVAA's gross profit margin in the 2013-2023 period. My calculation of gross profit margin reflects AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

#### **VI.D.2. Deterrent penalties based on expected *ex ante* value of the Bernanke program alone, using forecast margins**

- (114) While these numbers are substantial, they likely underestimate the expected benefits to Google from the Bernanke program. In the above calculations, I use the DVAA segment gross margins, but the “Beyond Bernanke” presentation shows expected profit margins for the incremental revenues from the Bernanke program that were greater than those for the DVAA segment as a whole.<sup>204</sup> In Figure 15, I use this higher profit margin in place of the DVAA gross margin. This increases the present value of expected profits to between [REDACTED] in 2013 dollars, and to between [REDACTED] in June 2025 dollars. Accounting for the probability of detection produces a range of potential deterrent penalties of between [REDACTED] billion in 2025 dollars.

<sup>204</sup> GOOG-DOJ-28385887 at -5895. The ‘RASTA’ results present Bernanke attributable revenues as [REDACTED] and profits as [REDACTED] over the period the experiment was run. Using these figures, Bernanke’s estimated profit margin is [REDACTED]

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**Figure 15: Deterrent penalties based on present value of incremental profit with “Beyond Bernanke” profit margin, Bernanke in isolation (2013 and 2025 dollars)**

Category	Scenario	Incremental profit	Profit-based deterrent penalty, using probability of detection:		
			33%	20%	10%
Incremental Profit as of 2013	3% annual growth				
	5% annual growth				
Incremental Profit as of June 2025	3% annual growth				
	5% annual growth				

Source: Bloomberg, GOOG-DOJ-28385887 at -5895, Andrien Report backup for Exhibit 2 (2013–2021). Skinner Report backup for Table 4B (2022–2023).

Notes: I calculate incremental profit as the product of the incremental annual revenue amount and the profit margin estimate calculated from the “Beyond Bernanke” results presentation. My calculation of gross profit margin reflects AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

- (115) To provide context for these numbers, recall that Dr. Wiggins claims that he “estimated the incremental profits that Google would have earned due to the alleged deception about RPO, DRS v1, DRS v2, and Bernanke to be \$21.7 million.”<sup>205</sup> And Dr. Wiggins goes further in arguing that none of the deceptive programs generated incremental profits for Google.<sup>206</sup> Meanwhile, the Google-internal estimate (before the start of this litigation) is that in a single year, the incremental profit that Google earned as a result of the Bernanke program alone is approximately [REDACTED].<sup>207</sup>

### **VI.D.3. Deterrent penalties based on expected *ex ante* combined value of Bernanke, DRS, and RPO programs**

- (116) The above calculations do not take into account the additional expected benefits of the DRS and RPO programs. Accordingly, I further examine the impact on the above calculations of the deterrent penalty amount by incorporating the incremental revenues and profits expected from these programs. In estimating the expected benefits from the three programs collectively, even though the alleged conduct started at different times for the different programs, for ease of presentation, I first

<sup>205</sup> Wiggins Report, ¶ 257.

<sup>206</sup> Wiggins Report, ¶ 19.

<sup>207</sup> Approximately [REDACTED] in annual revenue at profit rate of around [REDACTED] implies incremental profits of around [REDACTED] in a single year.

calculate the present value as of the end of 2013 and then bring the expected benefits forward to June 2025.<sup>208</sup>

- (117) Figure 16 shows that the present value of the expected revenues of the DRS, RPO, and Bernanke programs ranges from [REDACTED] in 2013 dollars and from [REDACTED] billion in 2025 dollars. The incremental profit figures increase to between \$2.9 billion and \$4.0 billion in 2013 dollars and between \$8.9 and \$12.4 billion in 2025 dollars. Accounting for the probability of detection and enforcement increases the deterrent amounts to between \$8.7 billion and \$40.3 billion in 2013 dollars, and to between \$26.7 billion and \$124.4 billion in 2025 dollars.

**Figure 16: Deterrent penalties based on present value of incremental benefit across Bernanke, DRS, and RPO combined (2013 and 2025 dollars, in millions)**

Category	Scenario	Incremental revenue	Incremental profit	Profit-based deterrent penalty, using probability of detection:		
				33%	20%	10%
Incremental benefit as of 2013	3% annual growth	[REDACTED]	\$2,888	\$8,664	\$14,441	\$28,881
	5% annual growth	[REDACTED]	\$4,030	\$12,091	\$20,151	\$40,302
Incremental benefit as of June 2025	3% annual growth	[REDACTED]	\$8,916	\$26,749	\$44,582	\$89,163
	5% annual growth	[REDACTED]	\$12,442	\$37,327	\$62,211	\$124,422

Source: Bloomberg, GOOG-DOJ-28385887 at -5895, GOOG-AT-MDL-B-001114919, GOOG-DOJ-32280412 at -0447, Andrien Report backup for Exhibit 2 (2013–2021). Skinner Report backup for Table 4B (2022–2023).

Notes: I calculate incremental profit as the product of each incremental annual revenue amount across the three programs and Google DVAA's gross profit margin in the 2013–2023 period. My calculation of gross profit margin reflects AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

- (118) My analysis above focuses on the incremental benefits of the Bernanke, DRS, and RPO programs, which constitute a subset of the programs at issue in this matter. For example, my calculations do not consider the benefits Google derived from Dynamic Allocation and Enhanced Dynamic Allocation, which I understand led to higher win rates, and consequently higher revenue, for AdX while conversely lowering the win rates and revenue for non-Google exchanges.<sup>209</sup> The values I present in Figure 16 would likely be larger had I considered the benefits from other Google programs.

<sup>208</sup> The RPO and DRS programs started in 2015 and the Bernanke program in 2013. See Andrien Report, ¶ 11.d. I use the 2015 WACC for the present value calculations of benefits from the RPO and DRS programs, and the 2013 WACC for those from the Bernanke program.

<sup>209</sup> Weinberg Report, ¶ 12.a.



**VI.D.4. Deterrent penalties if *ex ante* expected benefits limited to 20 years**

- (119) I have seen no information in the documents to indicate that Google expected the benefits from the programs at issue to be limited in time. Nonetheless, I evaluate the impact on the above calculations, if I were to assume that Google expected the benefits from these programs to only last for 20 years.
- (120) For brevity, I examine the impact on the lowest and highest of the above scenarios, i.e.: (i.) the first scenario above, limited to the benefits from Bernanke alone, using the DVAA profit margin, and assuming a 3% annual growth rate; and (ii.) the last scenario, which includes the benefits from the three programs at issue, and using a 5% annual growth rate. The results are shown in Figure 17, with the range of deterrent penalties ranging from [REDACTED] to \$75.9 billion in 2025 dollars.

**Figure 17: Deterrent penalties assuming a 20-year benefit term (2025 dollars, in millions)**

Scenario	PV of incremental profit as of 2025	Profit-based deterrent penalty, using probability of detection:		
		33%	20%	10%
Bernanke - 3%	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
All programs -5%	\$7,590	\$22,770	\$37,950	\$75,901

Source: Bloomberg, GOOG-DOJ-28385887 at -5895, GOOG-AT-MDL-B-001114919, GOOG-DOJ-32280412 at -0447, Andrien Report backup for Exhibit 2 (2013–2021). Skinner Report backup for Table 4B (2022–2023).

Notes: I calculate incremental profit as the product of each incremental annual revenue amount across the three programs and Google DVAA's gross profit margin in the 2013-2023 period. My calculation of gross profit margin reflects AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads.

**VI.D.5. Estimated *ex post* value to Google of conduct at issue**

- (121) The calculations above are estimates of what Google would have expected to earn in incremental benefits from the conduct at issue at the inception of the conduct (in late 2013 for Bernanke, and 2015 for the RPO and DRS programs). I now calculate the benefits from the perspective of 2025, as if the initially measured benefits were in fact realized on a going-forward basis, and if those benefits had grown at the actual rate of growth of Google's Ad Tech revenues, instead of using the 3% and 5% expected growth rates in my calculations above. Rather than bring the calculations back to 2013 dollars, here I bring the dollars forward to 2025 values to estimate the value of those past benefits to Google in terms of 2025 dollars. Figure 18 shows the results of these calculations applied to the Bernanke program alone, using the DVAA gross margins to derive the incremental profit calculations. These results show that the present value (as of 2025) of the incremental revenues and profits from the Bernanke program in isolation, assuming actual benefits were similar to expected benefits (scaled to actual revenues), would have been between approximately [REDACTED]



respectively through 2025, assuming that the incremental revenue resulting with the Bernanke program grew at the same rate as that of Google's DVAA segment.

**Figure 18: Present value of incremental benefit from Bernanke (\$ million, 2025 dollars)<sup>210</sup>**

Year	WACC	Gross profit margin	Incremental revenue (\$ million)		Incremental profit (\$ million)	
			Revenue	PV	Profit	PV
2014	10.2%					
2015	10.4%					
2016	10.7%					
2017	11.3%					
2018	12.1%					
2019	9.4%					
2020	7.6%					
2021	9.4%					
2022	10.6%					
2023	10.9%					
<b>2014-2023</b>						

Source: Bloomberg, GOOG-DOJ-28385887 at -5895, GOOG-AT-MDL-B-001114919, GOOG-DOJ-32280412 at -0447, GOOG-DOJ-28385887 at -5895, GOOG-AT-MDL-B-001114919, GOOG-DOJ-32280412 at -0447, Andrien Report backup for Exhibit 2 (2013–2021). Skinner Report backup for Table 4B (2022–2023).

Notes: I calculate incremental profit as the product of each incremental annual revenue amount and Google DVAA's gross profit margin in that year. My calculation of gross profit margin reflects AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads. Present Value of profit in year  $t$  is calculated as  $NominalProfit_t \times (1 + WACC_t)^{0.5} \times (1 + WACC_{t+1}) \times \dots \times (1 + WACC_{2024}) \times (1 + WACC_{2024})^{0.5}$ .

- (122) As above, I also perform these same calculations using the profit margins from the "Beyond Bernanke" presentation, which exceeds the DVAA gross margins. Substituting the DVAA gross margin with the Bernanke program margin increases the present value of incremental profits from [REDACTED] [REDACTED].<sup>211</sup> I further evaluate the impact on these calculations of including the total estimated benefits from the combined DRS, RPO, and Bernanke programs, using

<sup>210</sup> As the "Beyond Bernanke" presentation is dated to August 2015, I assume that the incremental revenue in 2014 would be half of the [REDACTED] amount to account for potentially lower benefits during the start-up phase of the program. See GOOG-DOJ-28385887.

<sup>211</sup> Calculation details are included in my backup materials.

the DVAA gross margin. Combining the results for all three programs increases the present value of the incremental profits to \$4.4 billion.<sup>212</sup>

- (123) Lastly, in Figure 19, I apply the probability of detection to derive the deterrent penalty amounts based on the incremental profits. This results in deterrent penalty amounts that range between [REDACTED] and \$43.7 billion. Again, a reasonable fact finder could determine that the appropriate penalty is within this range or, potentially, even higher.

**Figure 19: Deterrent penalties based on present value of realized incremental benefit, aggregated across the three programs (\$ million, 2025 dollars)**

Method	Incremental revenue	Incremental profit	Profit-based deterrent penalty, using probability of detection:		
			33%	20%	10%
Bernanke - DVAA average margin	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Bernanke - "Beyond Bernanke" margin	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
All programs combined - DVAA average margin	[REDACTED]	\$4,374	\$13,121	\$21,868	\$43,736

Source: Bloomberg, GOOG-DOJ-28385887 at -5895, GOOG-AT-MDL-B-001114919, GOOG-DOJ-32280412 at -0447, Andrien Report backup for Exhibit 2 (2013–2021). Skinner Report backup for Table 4B (2022–2023).

Notes: I calculate incremental profit as the product of the combined incremental annual revenue amount across the three programs and Google DVAA's gross profit margin in that year. My calculation of gross profit margin reflects AdSense for Content, AdX, Doubleclick Bid Manager, AdMob, Doubleclick for Publishers, AdServing, Ad Manager, AwBid, Display & Video 360, Campaign Manager, and Google Ads. Present Value of profit in year  $t$  is calculated as  $NominalProfit_t \times (1 + WACC_t)^{0.5} \times (1 + WACC_{t+1}) \times \dots \times (1 + WACC_{2024}) \times (1 + WACC_{2024})^{0.5}$ .

#### VI.D.6. Penalty amounts if based only on Google's benefits in Plaintiff States

- (124) As discussed above, for a penalty to have a deterrent effect in the Plaintiff States, it must be based in part on the total expected benefits (or social costs) of the conduct at issue, not based on a limited fraction of those expected benefits (or social costs). This is the reason why, in my calculations above, I use Google's total estimated incremental revenues and profits resulting from the conduct at issue, not a portion of those revenues and profits allocated to the Plaintiff States. If it were based on the latter, even after dividing by the probability of detection, enforcement, and penalty collection, the expected benefits to Google from engaging in the conduct would exceed its costs, and thus the penalty assessed by the Plaintiff States would be insufficient to deter this or similar future conduct in the Plaintiff States, either by Google or similarly situated parties. This is particularly the case here, given that the conduct at issue involves algorithms and programs that are deployed in Google's Ad

<sup>212</sup> Calculation details are included in my backup materials.

Tech products used in digital advertising auctions globally; and Google's other conduct at issue described in the complaint and the other expert reports, or the way in which it collects and uses information to disadvantage competitors and benefit its own business, is similarly global in nature. Additionally, even if Google ceased the conduct at issue and no longer directly accrues any associated incremental benefits, Google would still receive benefits from its past conduct into the future: to the extent that Google's deceptive conduct had an impact on competition in the Ad Tech industry,<sup>213</sup> e.g., contributing to the market exit of competitors or deterring potential market entrants, then Google's conduct will continue to yield benefits even after the cessation of the conduct. The appropriate penalty amount must therefore be higher to account for this. I further note that none of the penalty amounts I derive above exceed the Plaintiff States' statutory limits on the per violation penalty amount. For example, dividing the largest deterrent penalty amount calculated above, \$124.4 billion (see Figure 16), by even Dr. Wiggins's (under)estimate of the number of statutory violations (579 billion) results in a per violation penalty of \$0.21 per violation – far below the statutory maximum per violation specified in the relevant Plaintiff State statutes. Applying this \$124.4 billion deterrent penalty amount to the higher counts of violations I discuss above would simply reduce the per violation penalty even further.

- (125) Nonetheless, here I demonstrate the impact on my calculations above, if the jury or the court were to determine that only a portion of my estimates of the total deterrent penalty amount should be allocated to the Plaintiff States, e.g., based on either the fraction of Google's global conduct at issue occurring in the Plaintiff States, or based on the fraction of Google's revenues (either in total or in its Ad Tech business) associated with the Plaintiff States at issue. To do so, for the sake of simplicity, I use the portion of Google's Ad Tech total booked revenues allocated to the Plaintiff States by Mr. Andrien in his report and replicated above, [REDACTED] (see Figure 8), as a percentage of its total Ad Tech booked revenues, [REDACTED] (see Figure 5), or 13.7%. In doing so, however, it is important to note that this will necessarily underestimate, and likely substantially underestimate, that portion of Google's Ad Tech revenues that are related to the Plaintiff States, either via the affected publishers, advertisers, consumers, or Google infrastructure located in those states, as discussed above with regard to the allocation of affected revenue and transactions. With that important caveat in mind, even if such an allocation were required, and even if one were to use an allocation of 13.7% rather than a higher percentage, my deterrent penalty calculations above would still produce penalties of as much as \$17.0 billion (in 2025 dollar terms), e.g., multiplying 13.7% by the deterrent penalty amount of \$124.4 billion derived in Figure 16 (based on the expected benefits from Bernanke, DRS, and RPO, using an expected 5% annual growth rate, and accounting for a 10% probability of detection, enforcement, and penalty collection).<sup>214</sup>

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<sup>213</sup> See Section III.C, above.

<sup>214</sup> I calculate the impact of such an allocation on my other deterrent penalty calculations in my backup materials.

- (126) It is important to emphasize several points about any such allocation procedure, particularly as applied to the deterrent penalty amounts I derive above. First, given the estimates of the benefits of the conduct from Google's documents, the range of allocated penalties would no longer represent deterrent penalties, as articulated in the economic and finance literature referenced above; they represent significantly less than deterrent penalties and would not be sufficient to deter the conduct at issue in the Plaintiff States. Second, it is my understanding that neither the federal government nor the other non-plaintiff states are seeking to recover penalties; it is my understanding that the federal government does not have the statutory authority to do so. Nor is it my understanding that other jurisdictions outside the U.S. are seeking to recover penalties for the identical conduct at issue in this case. Thus, imposing on Google only a portion of the deterrent penalties I calculate above in Section VI.D.1 – Section VI.D.5 will substantially reduce, and potentially eliminate entirely, their deterrent effect. Third, such an allocation would significantly understate the likely benefits Google obtained within the Plaintiff States, not only because of the inherent downward bias in the 13.7% allocation factor noted above, but also because my calculations above are derived only from the incremental benefits to Google from the Bernanke, DRS, and RPO programs, not the additional benefits that Google likely obtained from Google's broader conduct at issue. Fourth, such an allocation would not reflect the amount of societal harm caused by the conduct in the Plaintiff States, which is likely much greater than Google's benefits, as discussed above. Fifth, it is my understanding that the jury may consider additional factors, in addition to deterrence, that may support penalties above the amounts that would otherwise result from applying an allocation percentage. Sixth, and finally, as discussed further in the following section, my analysis using an entirely different methodology for deriving deterrent penalties, i.e., one that does not rely on the estimated total benefits to Google from the conduct, indicates that penalties of between \$12 billion and \$25 billion, and likely higher, are necessary to have a deterrent effect on future conduct in the Plaintiff States by Google, and by similarly situated parties.

## VII. Google's prior penalties provide an alternative method to estimate deterrent penalties

- (127) In his report, Dr. Wiggins considers certain prior enforcement actions against Google, and certain fines and settlements paid by Google, but he concludes, "contrary to Mr. Andrien's claims, Google does not have a history of engaging in conduct similar to the deception alleged in this case."<sup>215</sup> I disagree with Dr. Wiggins's characterization of many of these proceedings as being either too far removed from the conduct at issue or from geographies too far remote (i.e., outside the U.S.) to be relevant, whether in the context of Mr. Andrien's analysis or in the context of factor (2) under the

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<sup>215</sup> Wiggins Report, ¶ 273.

Texas DTPA, for example.<sup>216</sup> My primary disagreement with Dr. Wiggins, however, is conceptual: Google's history of prior enforcement actions and prior penalties and settlements are highly relevant for assessing the penalty amount that would be necessary to deter Google or others from engaging in similar actions in the future. This is because these prior fines and settlements, even if they were for conduct entirely unrelated to the conduct at issue here, provide a way of assessing whether they had a sufficiently detectable impact on Google's stock price, such that they likely led, or would have led, to a change of behavior, independent of any explicit conduct remedies in those actions. In the language of statistics, these prior enforcement actions against Google provide a series of "natural experiments" with which to assess the amount of a penalty that is likely necessary to result in a change in Google's future conduct, particularly when that conduct is otherwise highly profitable (as is the case here). I analyze this further in the remainder of this section.

- (128) In the context of the principal-agent problem discussed in Section II.C, above, in which the current actions of managers (agents) may not align with the long-term interests of the shareholders (principals), an examination of Google's history with fines and settlements becomes particularly relevant. Historical penalties can be viewed as empirical tests that shed light on whether such financial punishments are substantial enough to influence corporate behavior, aligning it more closely with shareholder interests. If past penalties did lead to a substantial drop in Google's stock price, they might have incentivized shareholders to demand tighter controls and oversight over managerial decisions, thereby addressing the principal-agent problem with regard to the type of conduct at issue here. This potential alignment mechanism supports the need for a deterrent penalty that not only addresses the immediate misconduct but also serves to realign the interests of management with those of shareholders, ensuring that management does not engage in subsequent misconduct at the expense of long-term shareholder value. Thus, analyzing the impact of these penalties in the context of the principal-agent problem provides a valuable lens through which to assess the penalty amounts that are large enough to enforce corporate compliance and deter future misconduct.

## **VII.A. Previous enforcement actions show that large penalties are required to deter Google's conduct at issue**

- (129) Numerous U.S. federal, state, and international regulatory and enforcement agencies have brought actions against Google for alleged violations of various statutes between 2011 and the present, resulting in Google paying billions of dollars in fines and settlements.<sup>217</sup> These actions against Google, which have originated across the world but have been concentrated in the EU and the U.S.,

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<sup>216</sup> Texas Deceptive Trade Practices Act § 17.47(g)(2), ("(2) the history of previous violations").

<sup>217</sup> See Wiggins Report, Table 6.

have included allegations of violations related to antitrust, consumer privacy, and Ad Tech issues. In the EU, notable cases include the following:

- On November 30, 2010, the European Commission opened an antitrust investigation into allegations that Google has abused a dominant position in online search.<sup>218</sup> Subsequently, between 2017 and 2019, the European Commission imposed three fines on Google, amounting to a total of \$9.5 billion.
  - In 2017, Google was fined \$2.74 billion for illegally directing search results to Google Shopping, its own comparison shopping service.<sup>219</sup> Google appealed the decision to the EU General Court later in 2017, but the appeal was rejected on November 10, 2021.<sup>220</sup>
  - In 2018, Google was fined \$5.1 billion for illegally using its Android mobile operating system to impose restrictions on Android device manufacturers that served to funnel users toward the Google search engine.<sup>221</sup> Google's appeal of the decision was rejected by the EU General Court in 2022.<sup>222</sup>
  - In 2019, Google was fined \$1.69 billion for imposing exclusive contracts on publishers, which prohibited publishers from placing search results from rivals such as Microsoft and Yahoo on their websites.<sup>223</sup> Google appealed the ruling later in 2019, and the appeal is still pending a decision.<sup>224</sup>

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<sup>218</sup> European Commission, "Antitrust: Commission probes allegations of antitrust violations by Google," news release no. IP/10/1624, November 30, 2010, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_10\\_1624](https://ec.europa.eu/commission/presscorner/detail/en/IP_10_1624).

<sup>219</sup> Kelvin Chan, "Google loses appeal of huge EU fine over shopping searches," *Associated Press*, November 21, 2021, <https://apnews.com/article/business-european-union-european-commission-europe-euro-b7baf101cacca2f1a6d21faba5a7b91e>. See also "German price platform sues Google over search results," *Associated Press*, April 12, 2019, <https://apnews.com/international-news-general-news-744586e7278645bba829e81adf8ad9a6>.

<sup>220</sup> Alphabet Inc., *Form 10-K 2023*, January 30, 2024, 78. See also "Antitrust: Commission fines Google €2.42 billion for abusing dominance as search engine by giving illegal advantage to own comparison shopping service," European Commission, June 27, 2017, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_17\\_1784](https://ec.europa.eu/commission/presscorner/detail/en/IP_17_1784). Google's appeal to the European Court of Justice is pending decision as of the filing of this report.

<sup>221</sup> The European Commission announced this specific investigation on April 15, 2015, which appears to be a continuation of the 2010 investigation. See European Commission, "Antitrust: Commission sends Statement of Objections to Google on comparison shopping service; opens separate formal investigation on Android," news release no. IP/15/4780, April 15, 2015, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_15\\_4780](https://ec.europa.eu/commission/presscorner/detail/en/IP_15_4780). The original fine announced in 2018 was €4.34 billion (worth \$5.1 billion in 2018), which then reduced to €4.125 billion (worth \$4.13 billion) in 2022. Adam Satariano, "E.U. Scores Major Legal Victory Against Google," *New York Times*, September 14, 2022, <https://www.nytimes.com/2022/09/14/business/eu-google-antitrust-fine.html>.

<sup>222</sup> Google subsequently filed an appeal with the European Court of Justice. This appeal is pending decision as of the filing of this report. See *Form 10-K 2023*, January 30, 2024, 78.

<sup>223</sup> David Reid, "EU regulators hit Google with \$1.7 billion fine for blocking ad rivals," *CNBC*, March 20, 2019, <https://www.cnbc.com/2019/03/20/eu-vestager-hits-google-with-fine-for.html>.

<sup>224</sup> Alphabet Inc., *Form 10-K 2023*, January 30, 2024, 76.

- In 2023, after a two-year investigation of Google's Ad Tech business, the European Commission issued a "Statement of Objections," with a preliminary finding that Google has breached EU antitrust rules with its Ad Tech business, and with an additional preliminary finding that "only the mandatory divestment by Google of part of its services" would address its competition concerns.<sup>225</sup>

(130) In the U.S., notable prior enforcement actions against Google include the following:

- In 2011, Google agreed to forfeit \$500 million of revenue it had obtained by allowing Canadian pharmacies to advertise prescription drugs to U.S. consumers through its AdWords program.<sup>226</sup>
- In 2020, the U.S. DOJ and several states filed a complaint against Google, alleging that Google monopolized the markets for search and search advertising in the U.S.<sup>227</sup> On August 5, 2024, Federal Judge Amit P. Mehta ruled against Google, stating in his opinion that "Google is a monopolist."<sup>228</sup>
- In 2022, Google agreed to pay \$391.5 million to a 40-state coalition for continuing to collect user geolocation data after users had disabled location tracking.<sup>229</sup>
- In 2023, the U.S. DOJ filed a complaint against Google, alleging that Google monopolizes key elements of the Ad Tech stack.<sup>230</sup>

(131) Dr. Wiggins's Table 6 shows that Google has paid almost \$17 billion in settlements and fines across fifty distinct enforcement actions from 2011 through 2024.<sup>231</sup> As noted above, Dr. Wiggins opines

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<sup>225</sup> Alex Hern and Lisa O'Carroll, "EU regulator orders Google to sell part of ad-tech business," *The Guardian*, June 14, 2023, <https://www.theguardian.com/technology/2023/jun/14/eu-regulator-google-sell-ad-tech-business-competition-commission>. See also European Commission, "Antitrust: Commission sends Statement of Objections to Google over abusive practices in online advertising technology," news release, June 14, 2023, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_23\\_3207](https://ec.europa.eu/commission/presscorner/detail/en/IP_23_3207).

<sup>226</sup> U.S. Department of Justice, "Google Forfeits \$500 Million Generated by Online Ads & Prescription Drug Sales by Canadian Online Pharmacies," news release no. 11-1078, August 24, 2011, <https://www.justice.gov/opa/pr/google-forfeits-500-million-generated-online-ads-prescription-drug-sales-canadian-online>.

<sup>227</sup> U.S. Department of Justice, "Justice Department Sues Monopolist Google For Violating Antitrust Laws," news release no. 20-1124, October 20, 2020, <https://www.justice.gov/opa/pr/justice-department-sues-monopolist-google-violating-antitrust-laws>.

<sup>228</sup> Brian Fung and Clare Duffy, "Google has an illegal monopoly on search, judge rules. Here's what's next," *CNN*, August 6, 2024, <https://www.cnn.com/2024/08/05/business/google-loses-antitrust-lawsuit-doj/index.html>.

<sup>229</sup> Cecilia King, "Google Agrees to \$392 Million Privacy Settlement With 40 States," *New York Times*, November 14, 2022, <https://www.nytimes.com/2022/11/14/technology/google-privacy-settlement.html>.

<sup>230</sup> U.S. Department of Justice, "Justice Department Sues Google for Monopolizing Digital Advertising Technologies," news release no. 23-84, January 24, 2023, <https://www.justice.gov/opa/pr/justice-department-sues-google-monopolizing-digital-advertising-technologies>.

<sup>231</sup> See Wiggins Report, Table 6 and Table G1. Dr. Wiggins's Table 6 and Table G1 include a \$5 billion payment that was attributable to injunctive relief. See Wiggins Report, footnote 516.



that Google's history of fines and settlements is not relevant to this matter.<sup>232</sup> Additionally, Dr. Skinner argues Mr. Andrien's proposed penalty range could have "adverse consequences" on Google's "shareholders, business, competitive position, and ability to innovate,"<sup>233</sup> and Dr. Wiggins similarly claims that fines and settlements are "detrimental" to Google.<sup>234</sup> I disagree with both Dr. Wiggins and Dr. Skinner.

- (132) The EU settlements in particular illustrate the opposite of what Dr. Wiggins and Dr. Skinner contend: namely, those settlements show that Google has the capacity to absorb large penalties, in the billions of dollars, without experiencing financial difficulties. This is evidenced by the fact that Google has recognized initial charges of over \$9.5 billion related to the EU settlements on Google's dominant position in online search, which is above the lower bound of Mr. Andrien's penalty range, while remaining highly profitable, and in fact, becoming significantly more profitable and with its stock price continuing to rise considerably (its current stock price is more than 349% higher than it was in 2017 when the first of the large EU fines was assessed).<sup>235</sup>
- (133) The necessity of a substantial penalty amount is corroborated by other enforcement actions in which smaller penalties have failed to deter misconduct by similarly large and highly profitable companies. For example, on August 24, 2021, the Netherlands Authority for Consumers and Markets ("ACM") imposed a weekly fine of €5 million on Apple for forcing dating-app developers to use Apple's own payments service, disallowing the use of third-party services.<sup>236</sup> Rather than cease the conduct at issue, however, Apple instead continued to violate Dutch policy and was fined each week until the accrued fine grew to be €50 million, the maximum fine stipulated by the ACM.<sup>237</sup> Because Apple continued the conduct at issue even as the fines were accumulating, the value of the conduct to Apple appears to have been substantially greater than the €50 million fine, rendering the latter entirely insufficient as a deterrent. Apple's total fine at issue in that proceeding, which had no impact on Apple's conduct, was nearly three times higher than Dr. Wiggins's proposed \$22 million lower bound penalty for Google in this matter.

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<sup>232</sup> Wiggins Report, ¶¶ 274-278.

<sup>233</sup> Skinner Report, ¶ 15.

<sup>234</sup> Wiggins Report, ¶ 278.

<sup>235</sup> Alphabet Inc., *Form 10-K 2023*, January 30, 2024, 34, 76.

On June 27, 2017, the day the first major EU fine was announced, Google's stock price was \$47.4 per share. By August 23, 2024, the stock price had increased to \$165.6 per share.

<sup>236</sup> The Netherlands Authority for Consumers and Markets, *Summary of decision on abuse of dominant position by Apple*, August 24, 2021, 21, <https://www.acm.nl/sites/default/files/documents/summary-of-decision-on-abuse-of-dominant-position-by-apple.pdf>.

<sup>237</sup> *Ibid*; "Dutch regulator rejects Apple's objections to fines," *Reuters*, October 2, 2023, <https://www.reuters.com/technology/dutch-regulator-rejects-apples-objections-against-fines-2023-10-02/>.

## VII.B. Market reactions to Google's past penalties indicate that penalties below \$12 billion are unlikely to deter similar conduct in the future

- (134) As discussed above, the appropriate deterrent penalty should consider the principal-agent problem inherent to publicly traded companies. A small penalty amount would be unlikely to impact Google's share price, thereby offering little incentive for shareholders to monitor and deter misconduct. The penalty amount must therefore be substantial enough to have an adequate impact on the share price in order to incentivize shareholders to actively monitor and deter corporate misconduct.
- (135) To analyze the impact of previous investigations and penalties on Google's stock price, I collect information on 48 instances where Google was subjected to a fine or settlement on account of its conduct.<sup>238</sup> These penalties range between \$25,000 and over \$9.5 billion<sup>239</sup> prior to any subsequent reductions made by courts upon appeal by Google.<sup>240</sup> I identify 18 penalties imposed in the US, 18 imposed in the EU, and 12 imposed in India, South Korea, Russia, Turkey, or Australia. For each of these 48 instances, I identify the date that the penalty was publicly announced. I am also able to

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<sup>238</sup> I referred to three main sources: (1) the Wiggins Report and Andrien Report, (2) regulatory agency press releases, and (3) third-party sources, including news articles reporting the event and databases such as the GDPR Enforcement tracker and the Good Jobs First Violation tracker. All sources were cross-checked with at least one other to ensure the accuracy of the information collected on the penalty. See CMS, "GDPR Enforcement Tracker," <https://www.enforcementtracker.com/>. See also Good Jobs First, "Violation Tracker," <https://violationtracker.goodjobsfirst.org/>.

<sup>239</sup> As discussed above, on November 30, 2010, the European Commission opened an antitrust investigation into allegations that Google has abused a dominant position in online search. Subsequently, between 2017 and 2019, the European Commission imposed three fines on Google, amounting to a total of \$9.5 billion. Google was fined \$2.7 billion on June 27, 2017, for alleged self-preferencing in Google Shopping searches; \$5.1 billion on July 18, 2018, for alleged intentions to consolidate dominance in search on Android devices; and \$1.7 billion on March 20, 2019, for alleged abuse of dominance in AdSense. I sum these three penalties to approximate the severity of the 2010 investigation, which is \$9.5 billion. In addition to the initial announcement in 2010, the European Commission made a separate announcement of the investigation on Google's alleged intention to consolidate dominance in search on Android devices on April 15, 2015. There was a reduction of the \$5.1 billion fine to \$4.13 billion in 2022. I use the initial penalty in my analysis for all events. See European Commission, "Antitrust: Commission probes allegations of antitrust violations by Google," news release no. IP/10/1624, November 30, 2010, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_10\\_1624](https://ec.europa.eu/commission/presscorner/detail/en/IP_10_1624). See also European Commission, "Antitrust: Commission fines Google €2.42 billion for abusing dominance as search engine by giving illegal advantage to own comparison shopping service," news release no. IP/17/1784, June 27, 2017, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_17\\_1784](https://ec.europa.eu/commission/presscorner/detail/en/IP_17_1784); See also European Commission, "Antitrust: Commission fines Google €1.49 billion for abusive practices in online advertising," news release no. IP/19/1770, March 20, 2019, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_19\\_1770](https://ec.europa.eu/commission/presscorner/detail/en/IP_19_1770); See also Satariano, Adam, "E.U. Scores Major Legal Victory Against Google," *New York Times*, September 14, 2022, <https://www.nytimes.com/2022/09/14/business/eu-google-antitrust-fine.html>.

<sup>240</sup> For Google's prior penalties that I obtained from the Wiggins Report and Andrien Report, I used the penalty size provided by them unless the penalty had previously been announced at a larger size and later reduced by a court upon appeal by Google. In all other cases, I used the official penalty size as reported in press releases or the first news article which I could find reporting on the event. I convert the penalty to U.S. dollar using the exchange rate on the day that the penalty was publicly announced if the original penalty size was in a foreign currency.

identify the date on which the investigation was announced or the complaint was filed for 17 instances.<sup>241</sup> These 65 event days<sup>242</sup> on which the investigation or penalties were initially publicly announced span from April 2, 2008 to March 20, 2024.<sup>243</sup> To get a sense of the magnitude of these penalties, I calculated the standard deviation of Google's daily stock returns for 2008 and 2023, which are 3.5 percent and 1.9 percent, respectively. These two years represent the first and the most recent full years during which I identified an investigation leading to a penalty. The average market capitalization of Google in these two years is \$146 billion and \$1,510 billion. Thus, the random shocks equivalent to one standard deviation change to Google's stock returns in these two years translate to a change of \$5 billion and \$29 billion in Google's market capitalization, respectively. As this comparison makes clear, the past penalties imposed on Google have been small compared to the many other factors that affect Google's share price on a daily basis.

- (136) For each of these events, I conduct an event study in which I compare Google's stock return, net of the S&P 500 return, for each of the ten trading days before and after each event day, e.g., the public announcement of the investigation or the penalty.<sup>244</sup> Specifically, for each trading day surrounding the event, I calculate the return on Google's stock by determining the percentage change in the closing share price from the previous trading day. To evaluate Google's performance relative to the overall market, I subtract the S&P 500's return from Google's stock return.<sup>245</sup> Additionally, to analyze the volatility of Google's adjusted stock return, I compute the standard deviation of Google's adjusted stock returns on all trading days except the event days included in the analysis.
- (137) Figure 20 below presents Google's adjusted stock returns surrounding 48 event dates when penalties were publicly announced, spanning from ten trading days before to ten trading days after each event date. The fluctuations in Google's adjusted stock returns primarily remain within one standard

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<sup>241</sup> As discussed above, on November 30, 2010, the European Commission opened an antitrust investigation into allegations that Google has abused a dominant position in online search. On April 15, 2015, the European Commission announced a separate investigation into Google's illegal use of its Android mobile operating system to impose restrictions on Android device manufacturers, effectively funneling users toward the Google search engine, which appears to be a continuation of the 2010 investigation. I combine the Google stock returns on both days in my analysis.

I have not identified the date of the public announcement for some investigations because there was no public announcement until the penalty was publicly declared, or because there is no announcement available in an English-language source. This includes both official translations on the regulatory agency's website and reports from third-party sources.

<sup>242</sup> There are 48 event days of announcement of penalty and 17 event days of start of investigation.

<sup>243</sup> See my backup materials for details.

<sup>244</sup> When the event day falls on a non-trading day, I adjust the event day to the closest subsequent trading day.

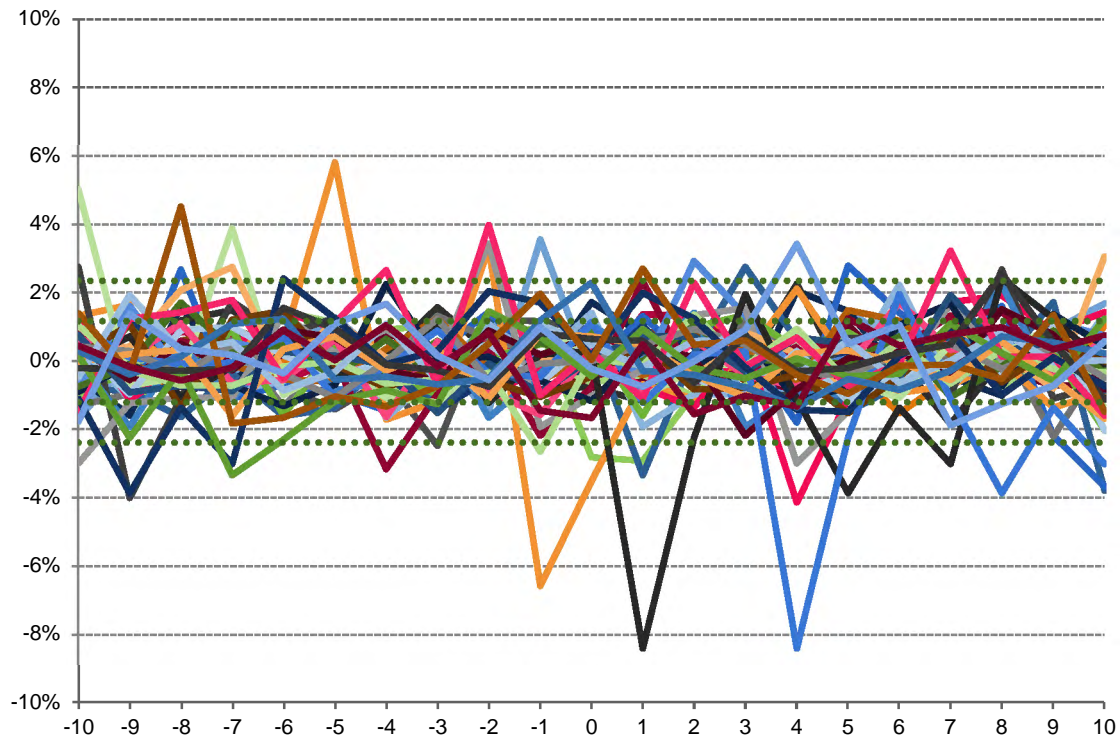
<sup>245</sup> The S&P 500 is an index that gauges the performance of the U.S. stock market. It monitors the share prices of the 500 largest publicly traded companies in the U.S. and represents approximately 80% of the total market value of all publicly traded stocks. See "What Does the S&P 500 Index Measure and How Is It Calculated?" Investopedia, accessed September 6, 2024, <https://www.investopedia.com/ask/answers/040215/what-does-sp-500-index-measure-and-how-it-calculated.asp>.

deviation from the average, and are mostly contained within two standard deviations.<sup>246</sup> Also, there is no noticeable change in the volatility of Google's adjusted stock returns before, on, or after the event day. This consistent pattern indicates that the stock returns do not experience additional significant volatility due to the penalties announced on the event days. Therefore, the analysis indicates that these prior penalties have had a minimal impact on Google's stock performance, providing little incentive for shareholders to actively engage in monitoring and deterring corporate misconduct.

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<sup>246</sup> The black line indicates a significant decline in Google's adjusted stock return the day following the event day. On October 25, 2022, the event day, Google announced third-quarter earnings that fell short of expectations in terms of both revenue and net income, which likely contributed to the subsequent drop in its stock value. Similarly, the light blue line indicates the same decline four trading days after the event day, which is also one day after October 25, 2022. See Capoot, Ashley, "Alphabet just had its worst day since March 2020, when Covid shutdowns started in the U.S.," *CNBC*, October 26, 2022, <https://www.cnbc.com/2022/10/26/alphabet-stock-falls-after-disappointing-earnings-report.html>. ("Shares of Alphabet closed down more than 9% on Wednesday in the company's worst day since March 2020 after it released third-quarter earnings Tuesday that missed on the top and bottom lines. The company reported its weakest quarter of growth since 2013 except for one other period early in the coronavirus pandemic. Revenue growth slowed to 6% from 41% a year earlier as the company contends with a continued downdraft in online ad spending."). Similarly, the orange line indicates a significant decline in Google's adjusted stock return the day before the event day. On February 8, 2023, the day before the event day, Google's new artificial intelligence technology produced a factual error in its debut demonstration, which likely contributed to the observed drop in Google's stock return on that day and the event day. See Olson, Emily, "Google shares drop \$100 billion after its new AI chatbot makes a mistake," *NPR*, February 9, 2023, <https://www.npr.org/2023/02/09/1155650909/google-chatbot--error-bard-shares>. ("Google's parent company, Alphabet, lost \$100 billion in market value on Wednesday after its new artificial intelligence technology produced a factual error in its first demo.").

**Figure 20: Google stock return net of S&P 500 over ten trading days before and after each penalty date**



Source: Bloomberg.

Note: The green dashed lines represent plus and minus one standard deviation, and plus and minus two standard deviations from the sample mean of adjusted stock returns, calculated using all trading days except for the event days included in this analysis.

- (138) Figure 21 below shows Google's stock return, net of the S&P 500 return, for the 48 days when a penalty was publicly announced. The size of each bubble corresponds to the initial penalty's magnitude. This figure indicates no evident correlation between the size of the penalties and their impact on Google's stock returns, which remains relatively consistent over time. The figure also includes one and two standard deviations from the sample average of Google's adjusted stock returns, represented by green horizontal lines. Most of Google's adjusted stock returns on these event days fall within one standard deviation, and all but two are within two standard deviations. One exception occurred on February 9, 2023, as I explained above, which coincides with an incident where Google's new artificial intelligence technology produced a factual error in its debut demonstration one day before the event day.<sup>247</sup> This confounding event likely contributed to the observed drop in Google's stock return on that day. Another exception occurred on April 13, 2012.

<sup>247</sup> See Olson, Emily, "Google shares drop \$100 billion after its new AI chatbot makes a mistake," *NPR*, February 9, 2023, <https://www.npr.org/2023/02/09/1155650909/google-chatbot--error-bard-shares>. ("Google's parent company, Alphabet, lost \$100 billion in market value on Wednesday after its new artificial intelligence technology produced a factual error in its first demo.").

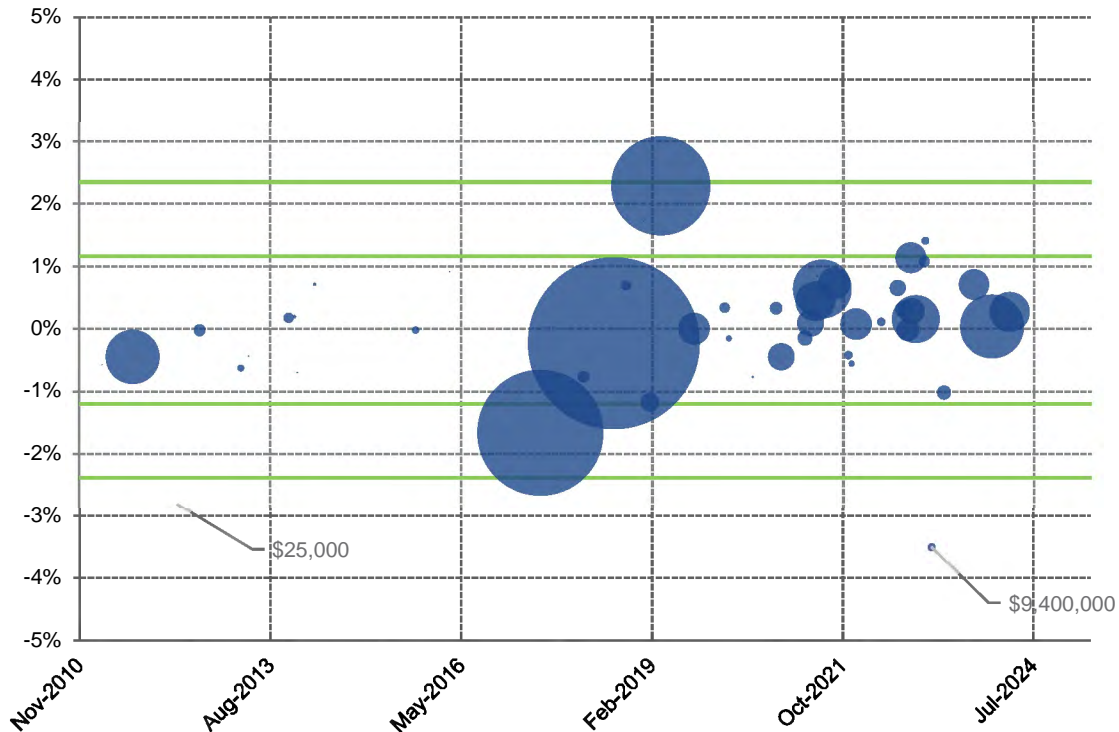
One day before that, Google announced a contentious stock split that enabled the company to issue new shares without diluting the voting power of its founders.<sup>248</sup> This move raised concerns among corporate governance watchdogs and frustrated some investors, contributing to the drop.<sup>249</sup> Considering the very small penalty of twenty-five thousand dollars imposed on Google at that time, it is highly unlikely that the penalty itself was the primary cause of the decline. Given that the volatility of Google's adjusted stock returns predominantly fall within the normal range expected from random fluctuations, the figure indicates that these penalties have had a minimal impact on Google's stock performance, providing little incentive for shareholders to actively monitor and deter corporate misconduct.

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<sup>248</sup> See Richard Davies, "Google's Stock Split Surprise," *ABC News*, April 13, 2012, <https://abcnews.go.com/blogs/business/2012/04/googles-stock-split-surprise>.

<sup>249</sup> See "Google falls on share plan," *Financial Post*, April 13, 2012, <https://financialpost.com/news/google-falls-on-share-plan>.

**Figure 21: Google stock return net of S&P 500 on the penalty days (bubble size corresponds to the amount of penalty)**



Source: Bloomberg.

Note: The green lines represent plus and minus one standard deviation, and plus and minus two standard deviations from the sample mean of adjusted stock returns. The standard deviation is calculated based on the adjusted stock returns from ten trading days before and after each event excluding the event days, encompassing all events included in this analysis.

- (139) For 17 of these event studies, I was also able to identify the day when the investigation was announced (which ultimately resulted in the penalty). At that point, there may already have been a stock market response, and the full impact may be considered to be equal to the sum of the stock return when the investigation was announced and the stock return when the penalty (and other remedies) were announced. Figure 22, below, replicates the above event analysis, where the relevant event dates are now the combination of the announcements of the investigation and the penalties. Thus, I sum Google's adjusted stock returns on both days for each event.<sup>250</sup> As above, the fluctuations in Google's adjusted stock returns primarily remain within one standard deviation from

<sup>250</sup> As I have explained above, there are five dates associated with the European Commission's investigation of Google Search: (1) the initial start of investigation day on November 30, 2010; (2) the follow-up announcement of investigation into Android operating system on April 15, 2015; and (3) the three dates that penalties were announced publicly on June 27, 2017, July 18, 2018, and March 20, 2019. I combine Google's adjusted stock return on these five days for this event in the analysis.



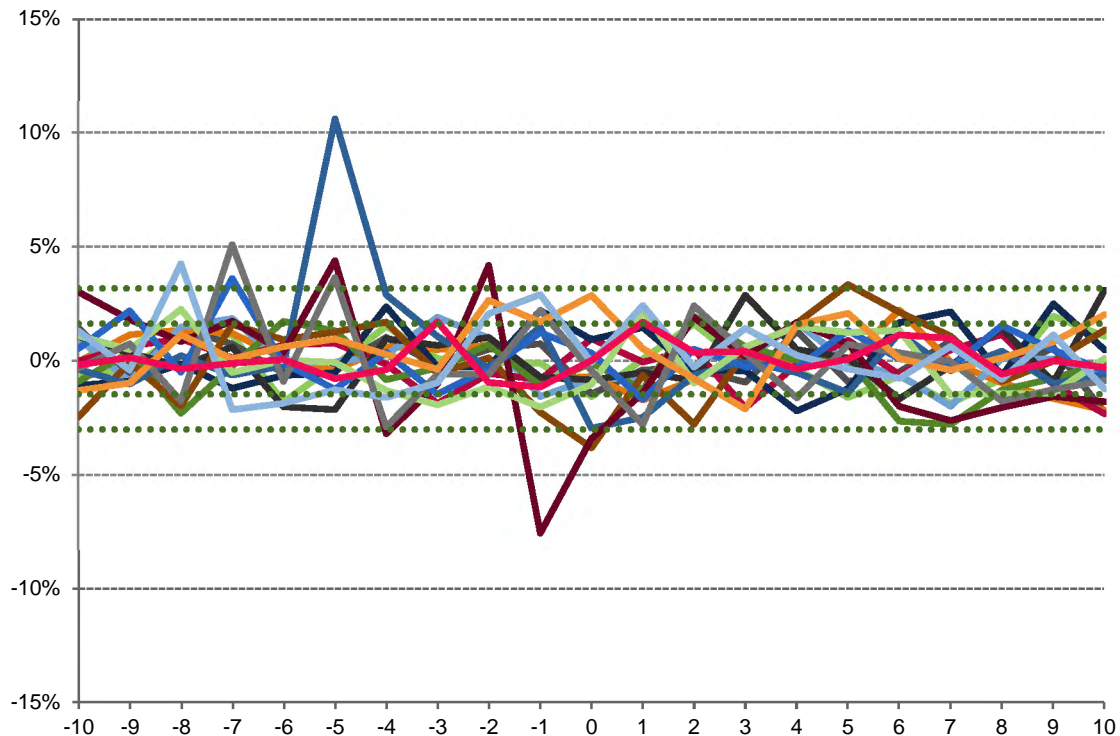
the average and are mostly contained within two standard deviations.<sup>251</sup> Also, there is no noticeable change in the volatility of Google's adjusted stock returns before, on, or after the event day. This consistent pattern indicates that the stock returns do not experience significant additional volatility due to the penalties announced on the event days.

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<sup>251</sup> The dark red line indicates a significant decline in Google's adjusted stock return the day before the event day. As I explained above, on February 8, 2023, the day before the event day, Google's new artificial intelligence technology produced a factual error in its debut demonstration, which likely contributed to the observed drop in Google's stock return on that day and the event day. See Olson, Emily, "Google shares drop \$100 billion after its new AI chatbot makes a mistake," *NPR*, February 9, 2023, <https://www.npr.org/2023/02/09/1155650909/google-chatbot--error-bard-shares>. ("Google's parent company, Alphabet, lost \$100 billion in market value on Wednesday after its new artificial intelligence technology produced a factual error in its first demo.").

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**Figure 22: Google combined stock return net of S&P 500 on both the start of investigation date and penalty date over ten trading days before and after the event date for eligible lawsuits**



Source: Bloomberg.

Note: The green dashed lines represent plus and minus one standard deviation, and plus and minus two standard deviations from the sample mean of combined adjusted stock returns, calculated using all trading days except for the event days included in this analysis.

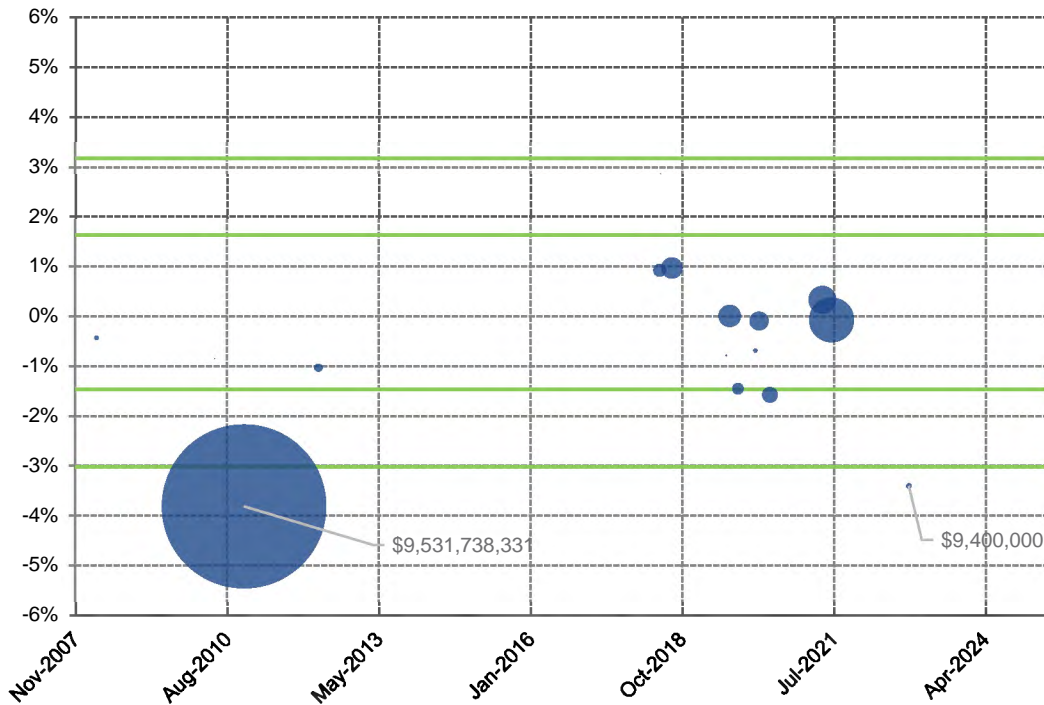
- (140) Similarly, I have replicated the bubble chart analysis above with Google's combined adjusted stock returns on the 17 events that include both the start of investigation date and penalty date.<sup>252</sup> Figure 23, below, shows that the combined adjusted stock returns for nearly all events are of modest magnitude, remaining within one standard deviation of typical daily fluctuations. The one noticeable exception is the European Commission's investigation of Google Search announced in late 2010, which led to a total penalty of \$9.5 billion. The combined adjusted return of the five associated event dates is -3.8%. In particular, on November 30, 2010—the day the initial investigation into allegations that Google has abused a dominant position in online search was announced—Google's adjusted stock return dropped by 3.9%, marking a highly unusual deviation.<sup>253</sup> Several news articles at the time linked this significant drop to the European Commission's announcement of the

<sup>252</sup> As explained above, I combine Google's adjusted stock returns on the five days associated with the European Commission's investigation into Google search announced in late 2010.

<sup>253</sup> Out of the 504 trading days in 2010 and 2011, there are only three trading days with a lower adjusted return than November 30, 2010. See my backup materials for details.

investigation.<sup>254</sup> The other outlier in the bottom right of the figure is likely due to the factual error made in the debut demonstration of Google's AI product, as discussed above.

**Figure 23: Google combined stock return net of S&P 500 on both start of investigation date and penalty date (date corresponds to the start of investigation; bubble size corresponds to the amount of penalty)**



Source: Bloomberg.

Note: The green lines represent plus and minus one standard deviation, and plus and minus two standard deviations from the sample mean of combined adjusted stock returns. The standard deviation is calculated based on the combined adjusted stock returns from ten trading days before and after each event excluding event days, encompassing all events.

- (141) These results indicate that, with the exception of EC investigation that resulted in penalties of \$9.5 billion (and associated remedies),<sup>255</sup> none of the other penalties (and associated remedies) were

<sup>254</sup> See Pepitone, Julianne, "Stocks end November with a whimper," *CNN Money*, November 30, 2010, [https://money.cnn.com/2010/11/30/markets/markets\\_newyork/index.htm](https://money.cnn.com/2010/11/30/markets/markets_newyork/index.htm). ("Google's (GOOG, Fortune 500) stock ended down more than 4.5% after the European Commission said it will investigate whether the Internet search company violated antitrust rules."). See also Jordans, Frank, "Tagged in a photo without consent? Europe watchdogs take up fight; regulators' probes set the stage for battle with Facebook, Google over protecting users' rights," *Mercury News*, March 25, 2010, <https://www.mercurynews.com/2010/11/30/european-authorities-investigating-whether-google-gave-its-services-search-preference/>. See also "EU sets up antitrust probe of how Google works," *Pioneer Press*, November 12, 2015, <https://www.twincities.com/2010/11/30/eu-sets-up-antitrust-probe-of-how-google-works/>.

<sup>255</sup> For example, the European Commission has placed injunctions against illegal restrictions on Android device manufacturers and mobile operators. It has also placed injunctions against self-preferencing own comparison shopping service in search results. See European Commission, "Antitrust: Commission fines Google €4.34 billion for abuse of dominance regarding Android devices," news release, July 18, 2018, [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_18\\_4581](https://ec.europa.eu/commission/presscorner/detail/en/IP_18_4581).

large enough to impact Google's stock market prices more so than any of the other multitude of factors that lead to the daily fluctuations in Google's share price. The conclusion I draw is not that there are no stock market responses to these penalties (and associated remedies), but rather that if there are such responses, they are so small that they are indistinguishable from all the other factors that result in movements in Google's share price and thus unlikely to induce shareholders to force managers to change their future conduct. When the European Commission first announced the investigation, it introduced significant uncertainty into the market regarding Google's future operations in Europe. Investors, concerned about potential fines, restrictions, and the impact on Google's European business, may have reacted negatively, leading to a drop in stock price. By the time the European Commission announced the actual penalty, the market may have already priced in the anticipated outcomes of the investigation. This means investors had enough time to evaluate the potential risks and adjust their positions accordingly. As a result, the actual penalty announcement may not have had a significant additional impact simply because the expected information was already reflected in the stock price. Thus, the size of the total penalties is a reasonable proxy of the severity of the investigation when it was initially announced.

- (142) Considering that the penalties were imposed in 2017, 2018, and 2019, and given the significant increase in Google's market capitalization since then, I have calculated the equivalent total penalty that could have a similar impact on Google's stock return as the initial announcement of the investigation by the European Commission in late 2010 for 2025 using various methods.
- (143) First, I compute the inflation-adjusted penalty imposed by the European Commission by using the projected inflation rates for each year from when the penalty was announced until June 2025, the earliest date on which I assume a penalty would be imposed on Google in this case.<sup>256</sup> Thus, as of June 2025, a deterrent penalty imposed in this matter would need to be at least \$12 billion to be consistent with the total inflation-adjusted value of the penalty previously imposed by the European Commission, which is a value that may have at least some measurable impact on Google's stock price.<sup>257</sup>
- (144) I note, however, that this \$12 billion value likely underestimates the size of the penalty required to have an impact on Google's stock price, given the rapid continued growth in Google's stock price since the time the European Commission penalty was announced. I address this in two alternative ways. First, I calculate the penalty by multiplying Google's WACC for each year from when the European Commission penalty was announced until June 2025. I use Google's WACC in 2024 as an

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<sup>256</sup> The (projected) inflation rates in the U.S. are downloaded from Statista. See "Projected annual inflation rate in the United States from 2010 to 2029," Statista, April 2024, <https://www.statista.com/statistics/244983/projected-inflation-rate-in-the-united-states/>.

<sup>257</sup> See my backup materials for details.

approximation of its WACC in 2025. This results in a WACC-adjusted penalty value as of June 2025 of \$17.9 billion.<sup>258</sup>

- (145) Second, I recalibrate each of the European Commission penalties based on the ratio of Google's market capitalization on August 29, 2024, the most recent day with available market capitalization data, to its market capitalization on the dates when each penalty was initially announced. I expect that the impact of a given penalty on a company's stock price depends on the company's total market capitalization; as Google's market capitalization has grown substantially since the imposition of the European Commission's penalties, it is thus reasonable to scale that penalty to be consistent with Google's current market capitalization. Using this adjustment suggests that a penalty of \$25 billion would be needed to have the same relative impact on Google's stock price as the prior European Commission penalties of \$9.5 billion.<sup>259</sup>
- (146) Thus, I conclude that penalties of between \$12 billion and \$25 billion, and likely even higher as explained above, would likely be necessary to create a sufficient impact on Google's stock price to ensure that shareholders, not only of Google but also of other similarly situated companies, deter management from engaging in such conduct in the future.

## VIII. Penalties of \$50 billion would not impair or disrupt Google's finances or operations

- (147) In his report, Dr. Wiggins claims that "measures of Google's overall financial performance are not relevant for assessing penalties related to the alleged deception."<sup>260</sup> Dr. Skinner similarly questions the relevance of Mr. Andrien's analysis of the financial performance of Alphabet and of Google's advertising business.<sup>261</sup> Dr. Skinner also takes issue with Mr. Andrien's conclusion that a hypothetical \$29 billion penalty imposed on Google "would not be so burdensome as to impact the day-to-day operations of the company"<sup>262</sup> and alleges that Mr. Andrien ignores the implications of the penalty for Alphabet's "business, competitive position, and ability to innovate."<sup>263</sup>

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<sup>258</sup> See my backup materials for details.

<sup>259</sup> See my backup materials for details.

<sup>260</sup> Wiggins Report, § VIII.B.

<sup>261</sup> Skinner Report, ¶ 59 and § IX; It makes no difference whether the analysis is of Google or Alphabet because in 2023 Google accounted for 99% of Alphabet's revenue and over 100% of its profits as other revenue streams operate at a loss. S&P Capital IQ. See my backup materials for details.

<sup>262</sup> Skinner Report, ¶ 65 and § X.

<sup>263</sup> Skinner Report, ¶ 15.

- (148) Contrary to the conclusions of Dr. Wiggins and Dr. Skinner, an analysis of Google’s financial performance and the potential impact of a given penalty amount on Google is highly relevant to assessing the appropriate amount of penalties for several reasons. First, some of the relevant Plaintiff States’ statutes, such as the Texas DTPA, explicitly require an evaluation of “the economic effect on the person against whom the penalty is assessed.”<sup>264</sup> Second, and central to the analysis of deterrence, it is also important to evaluate whether a given penalty, or range of penalties, would likely constitute “overdeterrence,” i.e., whether the amounts are so large that they would either cause Google financial difficulties (such as bankruptcy); limit Google’s ability to continue to invest in R&D, make capital expenditures, or acquire technology or complementary businesses (whether through acquisitions or mergers); limit Google’s access to capital (whether debt or equity financing); or interfere with Google’s day-to-day operations. If so, the penalty amount may constitute overdeterrence, in that it may interfere with otherwise socially beneficial activities, such as continued employment, investment, and innovation, not only for Google, but also for other companies that could potentially cease to engage in certain non-actionable conduct out of a fear of suffering severe financial repercussions from being found liable in an enforcement action. Similar issues of potential “overdeterrence” arise in assessing whether certain conduct is anticompetitive, such as predatory pricing, because penalizing such conduct too heavily (or wrongfully) could result in chilling the most common type of competition – price competition – that antitrust enforcement generally attempts to protect or even promote.
- (149) This is not to suggest that in all cases, the imposition of a penalty that resulted in such outcomes would necessarily constitute overdeterrence. In a case in which a company’s conduct was so egregious, the harm to the public so extensive, or even the continuing operations of the company under its current ownership of no redeeming social value, it may be appropriate to impose a penalty on a defendant that would result in such an outcome for the defendant, including bankruptcy. In this case, however, the question is whether deterrent penalties consistent with, or even well above those proposed by Mr. Andrien, would likely result in even a modest impact on Google’s finances, operations, or future R&D and investment endeavors, given its exceptionally high level of profitability and its substantial financial resources – which are, in part, attributable to the conduct at issue in this case.
- (150) To this end, I evaluate alternative financial metrics that allow me to evaluate the financial and operational impact on Google of a deterrent penalty of \$50 billion, or even higher amounts, consistent with the range of deterrent penalties I calculate in Section VI.D.<sup>265</sup> In particular, I analyze whether Google has adequate cash and cash equivalents on hand to pay such penalty amounts and

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<sup>264</sup> Texas Deceptive Trade Practices Act, accessed May 29, 2024, <https://statutes.capitol.texas.gov/Docs/BC/htm/BC.17.htm>, Sec. 17.47(g)(4).

<sup>265</sup> Andrien Report, ¶ 128 and Table 4.

whether doing so would impair or interfere with the company's operations (Section VIII.A). In Section VIII.B, I evaluate Alphabet's share repurchases as a further indication of its ability to generate sufficient cash to pay penalty amounts of \$50 billion without disrupting either its operating activities, R&D activities, capital expenditures, or mergers and acquisitions. In Section VIII.C, I show that Alphabet generates substantial free cash flow after allowing for spending on Alphabet's day-to-day operations, as well as after considering its capital expenditures (which help to generate future cash flows). I also discuss how Dr. Skinner's concerns about the potential negative impact of such penalty amounts on Alphabet's equity value ignores the fact that in order to have a deterrent effect, the penalty must have *some* negative impact on shareholders, given the principal-agent problems discussed above. Given the results of my analysis of the impact on Google's stock price of its previous penalties, I expect a penalty of \$50 billion would likely have an impact on Google's equity value; however, given the reaction of the company's stock price to past penalties when the company's market capitalization was substantially lower, I would not expect such an impact to interfere with its operations or substantially increase its future cost of equity.<sup>266</sup> Finally, in Section VIII.D, I analyze whether Alphabet has the ability to obtain additional debt financing, which could be used as an alternative funding source for paying the penalties, if Alphabet either were to have an unexpected need for cash, or if it chose to continue its stock repurchase program at its current level (or higher). Each of these alternative funding sources is more than adequate to finance penalties of \$50 billion, or even higher amounts.

### **VIII.A. Google's cash and cash equivalents on hand far exceed a potential penalty of \$50 billion**

- (151) Alphabet Inc., Google's parent company, is currently ranked 8<sup>th</sup> among the Fortune 500 companies as of July 11, 2024.<sup>267</sup> It was ranked 4<sup>th</sup> worldwide by market capitalization in 2023,<sup>268</sup> and its current market capitalization is over \$2 trillion.<sup>269</sup> It is also very profitable, earning over \$300 billion in revenues and \$88 billion in operating profit in 2023 alone. Google's revenues and its operating profit have grown substantially over the period at issue, with a CAGR of 18.7% and 19.1%, respectively.<sup>270</sup> Nor does Google appear to be slowing: for 2024, its revenues and profits are forecast to be 13.0%

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<sup>266</sup> As discussed above, Google's adjusted stock return on the day that the European Commission first announced the investigation into Google Search was dropped by more than two standard deviations. A two standard deviation drop in Google's adjusted stock return in 2024 corresponds to a \$59 billion change in its average market capitalization in 2024, which suggests that a penalty of \$59 billion would be needed to have the same relative impact on Google's stock price as the prior European Commission penalties of \$9.5 billion. See my Figure 29 backup materials for details.

<sup>267</sup> See "Fortune 500 Full List (2024)", 50Pros, accessed September 4, 2024, <https://www.50pros.com/fortune500>.

<sup>268</sup> "The 100 largest companies in the world by market capitalization in 2023," Statista, accessed September 4, 2024, <https://www.statista.com/statistics/263264/top-companies-in-the-world-by-market-capitalization/>.

<sup>269</sup> S&P Capital IQ, Alphabet Inc, Historical Capitalization, accessed August 29, 2024.

<sup>270</sup> See my backup materials for details.



and 28.8% higher than in 2023, with revenue and profit in 2025 forecasted to be 11.3% and 14.4% higher than in 2024.<sup>271</sup> Google has achieved very high operating margins throughout this period, even when its revenues were substantially less than they are today, as shown in Figure 24.

**Figure 24: Alphabet operating margin, 2013-2023**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Total Revenue (\$ billion)	\$56	\$66	\$75	\$90	\$111	\$137	\$162	\$183	\$258	\$283	\$307	\$1,727
Operating Profit (\$ billion)	\$15	\$17	\$19	\$24	\$29	\$33	\$36	\$41	\$79	\$75	\$88	\$456
Operating Margin	27.7%	25.6%	25.8%	26.3%	26.1%	23.8%	22.2%	22.6%	30.6%	26.5%	28.7%	26.4%

Source: S&P Capital IQ.

Note: Total revenue and operating profit are rounded to the nearest \$ billion, operating margin is calculated using unrounded numbers.

- (152) Given its exceptionally large size and profitability, Alphabet has a number of alternative sources of funds available to pay deterrent penalties well above \$50 billion. These include: (i.) its currently large amount of available cash and cash equivalents, including funds currently planned for share repurchases; (ii.) the large cash flows generated by its businesses on a current basis; and (iii.) its very large, and largely untapped, sources of external debt financing.
- (153) Alphabet's high levels of profits (or cash flows) generated by its business over the years has allowed it to build up and maintain significant reserves of cash and cash equivalents, even after using substantial amounts of cash to fund R&D, capital expenditures, mergers and acquisitions, and stock repurchases over the years.<sup>272</sup> Figure 25, below, shows Alphabet's cash holdings (which includes cash and cash equivalents, as well as highly liquid short-term investments) between 2013 and 2023. Google's current holdings of cash and equivalents of \$111 billion (as of the end of 2023) are more than double a fine of \$50 billion, clearly demonstrating that the payment of such penalties is feasible for Alphabet.

**Figure 25: Alphabet Cash and ST Investments (\$ billion), 2013-2023**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alphabet Inc.	\$57.4	\$62.6	\$71.9	\$86.3	\$101.9	\$109.1	\$119.7	\$136.7	\$139.6	\$113.8	\$110.9

Source: S&P Capital IQ.

<sup>271</sup> S&P Capital IQ. EBIT estimates are used for forecasted profits. See my backup materials for details.

<sup>272</sup> Though Alphabet's misconduct is alleged to continue to the present, I restrict my analyses to 2023, the last full year with financials. I reserve the right to update my analyses once full year information for 2024 (or beyond) becomes available.

- (154) Given that Alphabet has the ability to pay a \$50 billion penalty from the company's current cash balances, i.e., from (in effect) the company's accrued and undistributed past profits, it is also evident that such penalty amounts would also not have any impact on the firm's current and future operations, given the substantial positive cash flows the company generates, and is likely to continue to generate. As shown above, in Figure 24, Alphabet has high operating margins, which already accounts for its R&D spending.<sup>273</sup> Furthermore, Alphabet's current ratio, which is the ratio of its current assets to its current liabilities and measures whether a firm has sufficient working capital,<sup>274</sup> is and has been significantly higher than those of similar firms, as seen in Figure 26, below.<sup>275</sup> The current ratio for Alphabet has exceeded the 75<sup>th</sup> percentile of those for its peer companies every year, and it also far exceeds the current ratio for the median company in the S&P 500.<sup>276</sup> In addition, reflecting its very low amounts of debt and net interest expense, Alphabet also has, and has had, an exceptionally high interest coverage ratio, which is the ratio of a company's earnings before interest and taxes ("EBIT") to its interest expenses and which reflects its ability to service its debt from its current earnings.<sup>277</sup> Figure 27, below, shows that Alphabet's interest coverage ratio has been higher than the 75<sup>th</sup> percentile of its peers in almost every year during the period at issue, and it is substantially higher than the S&P 500 median company.

**Figure 26: Current Ratio for Alphabet and comparable companies, 2013-2023**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alphabet Inc.	4.58x	4.69x	4.67x	6.29x	5.14x	3.92x	3.37x	3.07x	2.93x	2.38x	2.10x
Peers: 75th percentile	3.09x	2.48x	2.58x	2.35x	2.73x	2.53x	2.35x	2.10x	2.26x	1.82x	1.70x
S&P 500: median company	1.44x	1.44x	1.30x	1.58x	1.66x	1.67x	1.79x	1.67x	1.55x	1.55x	1.55x

Source: S&P Capital IQ.

<sup>273</sup> S&P Capital IQ, Alphabet Inc, Income Statement, accessed August 29, 2024. Operating profit is net of R&D spending.

<sup>274</sup> Jonathan Berk and Peter DeMarzo, *Corporate Finance*, (Pearson: Third Edition), pp. 36–37.

<sup>275</sup> For each year, I identify Alphabet's peers as Nasdaq-listed firms that are headquartered in the U.S., are in the Nasdaq Global Select Market tier of the Nasdaq stock market, and have the same two-digit SIC as Alphabet (i.e., 73). From this set, I further limit the set of peers to be firms that lie in the top 10% in annual revenues, replacing companies that did not have market capitalization data in a given year with the company having the next highest revenue. I use these same peers for all subsequent peer comparisons.

<sup>276</sup> I identify the median company in the S&P 500 based on revenues in 2023. Two companies, Henry Schien, Inc. and S&P Global, Inc., have 2023 revenues closest to the 2023 median. Of these two, I select Henry Schein, Inc., as it had greater revenues in prior years (2013–2022). Henceforth, I refer to Henry Schein, Inc. as the "S&P 500 median company" in my analyses. See my backup materials for details.

<sup>277</sup> Jonathan Berk and Peter DeMarzo, *Corporate Finance*, (Pearson: Third Edition), pp. 38–39.

**Figure 27: Interest Coverage Ratio for Alphabet and comparable companies, 2013-2023**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alphabet Inc.	190.2x	167.1x	186.2x	191.3x	265.3x	285.9x	359.3x	305.4x	227.5x	209.6x	286.4x
Peers: 75th percentile	61.1x	237.2x	194.8x	120.5x	94.7x	32.3x	24.3x	35.6x	54.0x	45.6x	55.2x
S&P 500: median company	29.7x	28.1x	26.7x	23.0x	11.1x	11.3x	17.3x	17.0x	22.3x	17.2x	6.9x

Source: S&amp;P Capital IQ.

- (155) While Alphabet's cash holdings are substantial, I next assess whether Alphabet has excess cash available, i.e., cash holdings over and above what may be needed for day-to-day operations. Figure 28, below, shows Alphabet's level of cash holdings as a multiple of the firm's current liabilities (i.e., its "cash ratio," a common measure of a firm's liquidity).<sup>278</sup> In order to assess whether Alphabet has excess cash available, I compare Alphabet's cash multiple with those of the peer firms. Alphabet's cash multiple exceeds the 75<sup>th</sup> percentile every year, and it also far exceeds the cash multiple for the S&P 500 median company. This further indicates that Alphabet has substantial amounts of excess cash holdings on hand, well in excess of its operating or current financing needs.

**Figure 28: Cash Ratio for Alphabet and comparable companies, 2013-2023**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alphabet Inc.	3.61x	3.73x	3.72x	5.15x	4.21x	3.15x	2.65x	2.41x	2.17x	1.64x	1.36x
Peers: 75th percentile	2.10x	1.59x	1.85x	1.90x	1.85x	1.67x	1.30x	1.49x	1.46x	1.00x	1.02x
S&P 500: median company	0.08x	0.03x	0.02x	0.03x	0.08x	0.02x	0.05x	0.16x	0.05x	0.05x	0.07x
<b>Panel B: Impact of penalty payment on Alphabet Inc.</b>											
Lump sum: \$50B											0.74x
Allocated: \$50B	3.60x	3.62x	3.61x	4.99x	4.08x	3.03x	2.54x	2.31x	2.05x	1.52x	1.24x

Source: S&amp;P Capital IQ.

Note: Penalties are allocated proportional to Alphabet's total revenue. See Appendix E for penalty allocations by year.

- (156) As the literature in financial economics recognizes, companies generally prefer to use their retained earnings as their most preferred source of financing, followed by debt issuance.<sup>279</sup> I next assess the implication of a \$50 billion penalty for the cash ratio. I consider two alternative approaches for paying a \$50 billion penalty. First, I consider what would have been the impact on Alphabet of paying the penalty amount as a lump sum in 2023. I use 2023 as a proxy for 2025, the earliest that I assume Alphabet would be required to pay a penalty amount and the current trial date; this will overstate the impact on Alphabet of such a lump sum penalty payment, since Alphabet's business has

<sup>278</sup> Cash ratio reflects the firm's need for cash to meet its short-term obligations, such as employee pay. See Jonathan Berk and Peter DeMarzo, *Corporate Finance*, (Pearson: Third Edition), p. 37.

<sup>279</sup> This idea is referred to as the pecking order hypothesis. See, e.g., Jonathan Berk and Peter DeMarzo, *Corporate Finance*, Third Edition, Pearson, Chapter 16, p. 570.

continued to grow since 2023, and it is expected to grow further in 2025, as noted above.<sup>280</sup> Second, I consider the impact on Alphabet of financing the penalty amount and, in effect, paying for the financing of the penalty over a period of time from its future cash generated by its operations. Rather than developing a forecast of its future operations and cash holdings, I take an alternative approach of simply assuming that the penalty had been paid out of its revenues earned from November 2013 through 2023.<sup>281</sup> This is a highly conservative approach, as Google's revenues and operating profits today are approximately six times higher than they were in 2013, for example; nonetheless, this approach also has the advantage of allowing for an evaluation of whether the \$50 billion penalty is in some sense overly confiscatory of Google's past profits. I show the allocation of the penalty to each period in Appendix E.<sup>282</sup>

- (157) As Panel B in Figure 28 above shows, Alphabet's post-payment cash multiple is lower with a lump-sum payment: it is closer to the median cash multiple of its peers (0.79x), but still substantially above the median of the S&P 500. Using an allocation method for penalties, Alphabet's post-payment cash multiple continues to be well above the 75<sup>th</sup> percentile of its peer companies. Thus, a penalty of \$50 billion can be paid from Alphabet's substantial excess cash holdings. In addition, if the penalty had been assessed on a pro-rata basis on Alphabet's past earnings during the years at issue, it could also have easily made these payments without disrupting its operating activities; in other words, the lack of any operational impact on Alphabet of a fine of this magnitude is not simply a reflection of its current high level of profits, but also is supported by its financial performance during the years at issue. If Alphabet were to finance the penalties in some other way, such as by issuing additional debt, it would have even less of an impact on its going-forward operating and investing activities.

## **VIII.B. Alphabet's frequent and substantial share repurchases demonstrate its cash available to pay a potential penalty of \$50 billion**

- (158) Over the years, Alphabet has used the cash generated from its operations to repurchase a substantial volume of its shares through multiple share repurchase programs. Figure 29, below, lists all such repurchase programs since 2013. Cumulatively, Google has authorized share repurchases of \$346 billion, of which \$240 billion in cumulative repurchases had been completed through the end of 2023.<sup>283</sup> This shows the availability of substantial amounts of cash that Alphabet has chosen to

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<sup>280</sup> In 2024, Alphabet's revenues and profits are forecast to be 13.0% and 28.8% higher than in 2023, with revenue and profit in 2025 forecasted to be 11.3% and 14.4% higher than in 2024. S&P Capital IQ. See my backup materials for details.

<sup>281</sup> The earliest start date for a DTPA claim is November 11, 2013. See Andrien Report, Exhibit 2, note 8.

<sup>282</sup> Because the penalty assigned to each year does not account for the time value of money, the impact of the penalty on Alphabet is exaggerated.

<sup>283</sup> S&P Capital IQ; Form 10-K filings, 2015-2023. See my backup materials for details.

return to shareholders, which were not needed for its operating or investing activities (including for its many acquisitions). This amount, when combined with excess cash holdings discussed above, further demonstrates the feasibility of Alphabet paying the penalty without affecting its business operations.

**Figure 29: Alphabet Inc. stock repurchase announcements and time to completion, 2013-2024**

Announcement index	Amount (\$ million)	Date announced	Total quarters to completion
1	\$5,099	Oct-15	3
2	\$7,019	Oct-16	6
3	\$8,590	Jan-18	5
4	\$12,500	Jan-19	4
5	\$25,000	Jul-19	5
6	\$28,000	Jul-20	4
7	\$50,000	Apr-21	5
8	\$70,000	Apr-22	5
9	\$70,000	Apr-23	5+
10	\$70,000	Apr-24	1+

Source: S&P Capital IQ; Alphabet Inc., Form 10-K filings, 2015-2023; Alphabet Inc., Q3 2015 Earnings Call, Oct 22, 2015, 6; Alphabet Inc., Q3 2016 Earnings Call, Oct 27, 2016, 7; Alphabet Inc., Q1 2024 Earnings Call, April 25, 2024, 10.

Notes: Where no specific end dates are given for a repurchase announcement, repurchase end dates are calculated for a given announcement using a first in, first out method. When there are overlapping stock repurchase announcements, stock repurchases are allocated to the earlier announcement. Repurchase announcements are considered completed in the quarter they are paid off.

- (159) In his analysis of the potential effect of a \$29 billion penalty on Alphabet, Mr. Andrien points to Alphabet's recent \$70 billion share repurchase announcement as an indication that Alphabet could simply limit the size of its share repurchases and instead use some of this cash to pay for the penalty instead.<sup>284</sup> Dr. Skinner, however, criticizes Mr. Andrien for failing to assess the potential negative impact of a change in Alphabet's announced share repurchase plan on the firm's operations and its shareholders.<sup>285</sup> Dr. Skinner does not provide any evidence to suggest that such a change would likely have a significant impact, either on the company's operations or its shareholders.
- (160) In fact, Dr. Skinner ignores the common motivation for share repurchases: firms generally repurchase their shares when they have excess cash (in excess of their operating or investing needs); or if they want to change the capital structure by increasing the share of debt (generally, a less expensive source of capital) relative to equity (generally, a relatively more expensive source of capital). In the case of Alphabet, the reason for share repurchase is in line with its exceptionally high cash holdings, above and beyond its operating and investing needs, as discussed above, and not driven by the need

<sup>284</sup> Andrien Report, ¶ 139.

<sup>285</sup> Skinner Report, ¶ 72.

to increase its debt to equity ratio (which, as I discuss below, was quite low even with the share repurchase plan already in place). Furthermore, by the very nature of the program, a decision to use the surplus funds to pay a penalty imposed on Alphabet for alleged misconduct in place of share repurchases would not prevent Alphabet from pursuing profitable investment opportunities. The share repurchase decision is a strong signal that Alphabet does not have additional positive NPV projects available to which the funds allocated for the stock repurchase program can be applied.<sup>286</sup> That is, in fact, the very reason firms return excess cash to shareholders: they simply do not have a way of using that cash to generate additional returns to shareholders in excess of the firm's cost of capital.

- (161) Dr. Skinner's concerns regarding a potentially negative implication of reversing Alphabet's share repurchase program are exaggerated, particularly in comparison with reversing an alternative form of payout, namely dividends. Because dividends represent a commitment to future payouts, markets tend to penalize firms that cut dividends. On the other hand, there is no implicit or explicit obligation for a firm to follow through with an announced share repurchase program, nor an expectation of continued future programs.<sup>287</sup> In fact, Alphabet's history provides evidence of the inherent financial flexibility in share repurchases. As Figure 29 above shows, Alphabet has announced multiple share repurchase plans over the years. However, there have been variations in the time between plans, the size of the plans, and the duration over which the plans have been implemented. Because share repurchases allow firms to preserve financial flexibility, one would not expect there to be a significant cost to Alphabet (e.g., in the form of an increase in its future cost of equity) if it were to reverse the program, whether in whole or in part.
- (162) Furthermore, Dr. Skinner's concern regarding the potential adverse signaling effect to shareholders is irrelevant in assessing whether the penalty will actually be sufficient to deter such conduct in the future, either by Google or by other similarly situated companies. As discussed above, in light of the principal-agent problem, in order for the penalty to have any deterrent effect, it needs to be sufficiently large for shareholders to have an incentive to deter the type of conduct that led to the imposition of the penalty. Thus, from a deterrence perspective, if there were a negative stock reaction to a rollback of the current share repurchase plan (in part or in its entirety) for paying the penalty, some negative reaction would be a *desirable* effect of the penalty amount, not a drawback, as Dr. Skinner assumes.
- (163) In fact, the company's share repurchases are an underestimate of the available cash the company has available to pay a penalty. As shown above, in recent years, Alphabet has been able to continue

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<sup>286</sup> Richard Brealey, Stewart Myers, and Franklin Allen, *Principles of Corporate Finance*, (McGraw Hill, Eighth Edition), Chapter 16, p. 420.

<sup>287</sup> Murali Jagannathan, Clifford Stephens, and Michael Weisbach, "Financial Flexibility and the Choice Between Dividends and Stock Repurchases," *Journal of Financial Economics* 57 (2000): 355–384, at 356.

to replenish its cash balances – including its excess cash – out of the continued profitability and growth of its current operations while simultaneously engaging in continuous large share buyback programs. Thus, in this context, its excess cash holdings (consistently being replenished from current cash flows) and the funds it has available for share buybacks are two alternative sources of funds that Alphabet has available for paying penalties. To estimate the likely maximum available cash from both these sources, I consider: (i.) Alphabet’s excess cash holdings, based on the difference between Alphabet’s and the median firm’s cash ratio multiple; and (ii.) funds used for Alphabet’s share repurchase programs. Figure 30, below, shows Alphabet’s ability to pay up to \$107.7 billion in 2023 alone, far in excess of a \$50 billion penalty.

**Figure 30: Alphabet Inc. potential cash holdings (\$ million), 2023**

Category	2023
Excess Cash & ST Investments (year-end balance)	\$46,236
Stock buybacks (purchased during 2023)	\$61,504
<b>Total</b>	<b>\$107,740</b>

Source: S&P Capital IQ

Note: Excess Cash & ST Investments is calculated as the difference between Alphabet’s cash holdings and the amount of cash if Alphabet had the median comparable company’s Cash Ratio. Stock buybacks reflects the repurchase of common stock from Alphabet’s 2023 Form 10-K Cash Flow Statement. In April 2023, Alphabet announced a \$70 billion share buyback of which \$65.2 billion was repurchased as of June 30, 2024. See my Figure 29 backup materials for details.

### **VIII.C. Google’s free cash flow from operations in a single year exceed a potential penalty of \$50 billion**

- (164) In assessing the reasonableness of his proposed penalty, Mr. Andrien notes that the penalty would not “impact the day-to-day operations” of Alphabet.<sup>288</sup> Dr. Skinner takes exception and criticizes Mr. Andrien for not defining what “day-to-day operations” could mean.<sup>289</sup> Because a penalty that disrupts a company’s operations may constitute “overdeterrence,” in this section, I address Dr. Skinner’s concern by calculating Alphabet’s cash flow from its operations each year, which takes into account its ability to pay its operating expenses, pay for its R&D activities, service its debt, and provide sufficient cash for net working capital to maintain the firm’s day-to-day operations.
- (165) Figure 31, below, shows that Alphabet generated over \$100 billion in cash flows from operations in 2023 alone. This is more than adequate to pay a penalty of \$50 billion. In fact, Alphabet’s cash flow from operations would have been sufficient to make such a payment in each year from 2020 through 2023.

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<sup>288</sup> Andrien Report, ¶ 131.

<sup>289</sup> Skinner Report, ¶ 15.



- (166) Dr. Skinner also states that such penalty amounts would, or may, have adverse consequences on Alphabet's "business, competitive position, and ability to innovate."<sup>290</sup> I consider several categories of spending that would have implications for Alphabet's longer-term competitiveness and performance, namely its capital expenditures and its acquisitions financed through cash (its R&D expenditures, another potential source for firms' competitiveness and presumably the source of the company's "ability to innovate," is already addressed in my analysis of the cash flow from operations). As Figure 31, below, shows, after allowing for capital expenditures (and with adjustment for any change in the level of debt, which is quite small), Alphabet still generated enough free cash flow (i.e., free cash flow to equity) to pay a \$50 billion penalty in every year from 2020 through 2023.
- (167) Even after allowing for cash acquisitions from these cash flows, Alphabet would have had sufficient surplus cash holdings after paying the penalty as a lump sum in 2023, or if one were to allocate the penalty payment to each of the prior years from November 2013 through 2023 (see Panel B in Figure 31, below).

**Figure 31: Alphabet Free Cash Flow to Equity (\$ billion), 2013-2023**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Cash Flow from Operating Activities	\$18.7	\$23.0	\$26.6	\$36.0	\$37.1	\$48.0	\$54.5	\$65.1	\$91.7	\$91.5	\$101.7
Change in Total Debt from previous year	-\$0.6	\$1.4	-\$0.4	-\$3.7	\$0.0	\$0.0	\$12.1	\$11.8	\$0.6	\$1.5	-\$0.1
Capital Expenditures	-\$7.4	-\$11.0	-\$10.0	-\$10.2	-\$13.2	-\$25.1	-\$23.5	-\$22.3	-\$24.6	-\$31.5	-\$32.3
<b>Free Cash Flow to Equity</b>	<b>\$10.7</b>	<b>\$13.4</b>	<b>\$16.3</b>	<b>\$22.1</b>	<b>\$23.9</b>	<b>\$22.9</b>	<b>\$43.0</b>	<b>\$54.6</b>	<b>\$67.6</b>	<b>\$61.5</b>	<b>\$69.4</b>
Cash Acquisitions	-\$1.4	-\$4.9	-\$0.2	-\$1.0	-\$0.3	-\$1.5	-\$2.5	-\$0.7	-\$2.6	-\$7.0	-\$0.5
<b>Free Cash Flow to Equity (less Cash Acquisitions)</b>	<b>\$9.3</b>	<b>\$8.5</b>	<b>\$16.0</b>	<b>\$21.1</b>	<b>\$23.7</b>	<b>\$21.4</b>	<b>\$40.5</b>	<b>\$53.9</b>	<b>\$65.0</b>	<b>\$54.5</b>	<b>\$68.9</b>
<b>Panel B: Impact of penalty payment on Alphabet Inc. on Free Cash Flow to Equity (less Cash Acquisitions)</b>											
Lump sum: \$50B											\$18.9
Allocated: \$50B	\$9.0	\$6.6	\$13.8	\$18.4	\$20.4	\$17.3	\$35.7	\$48.5	\$57.4	\$46.1	\$59.7

Source: S&amp;P Capital IQ.

Note: Penalties are allocated proportional to Alphabet's total revenue. See Appendix E for penalty allocations by year.

- (168) Ultimately, Alphabet's market capitalization is, in effect, the market's estimate of the company's discounted *future* free cash flow to equity holders. As of the end of 2023, Alphabet's market capitalization was \$1.75 trillion, while it is currently over \$2 trillion, which is 40 times higher than a \$50 billion penalty.<sup>291</sup> This further indicates that Alphabet will be able to bear the cost of the penalty

<sup>290</sup> Skinner Report, ¶ 15.<sup>291</sup> S&P Capital IQ, Alphabet Inc, Historical Capitalization, accessed August 29, 2024.

amounts, whether paid as a lump sum out of its current cash or financed and spread over future years out of its future earnings.

## VIII.D. Alphabet has a substantial ability to raise additional debt to pay a potential \$50 billion penalty, if needed

- (169) Instead of using its substantial excess available cash, Alphabet could also simply issue new debt as an alternative funding source to make the penalty payments of \$50 billion. As Figure 32 shows, in every year except 2013, Alphabet's debt to market capitalization ratio was lower than that of the 25<sup>th</sup> percentile of its peers, and significantly lower than the median S&P 500 company, indicating its exceptionally low level of debt. Its total debt outstanding (including current portions of long-term debt and leases) as of the end of 2023 was only \$29.9 billion;<sup>292</sup> it also had \$10 billion available on credit lines, which it rarely appears to have used.<sup>293</sup> If Google were to increase its debt to achieve the (still exceptionally low) median debt to market capitalization ratio of its peers in 2023 (i.e., 0.05x), Google could raise an additional \$49.4 billion in debt; using the debt to market capitalization ratio of the median company in the S&P 500 that I identified previously, 0.28x, implies that Google could raise an additional \$459.2 billion in debt.<sup>294</sup> Alphabet's high-grade long-term issuer credit rating by Moody's (Aa2) further indicates that it would be able to raise an additional \$50 billion worth of debt, or substantially more, relatively cheaply, if it chose to fund the penalty payment in this way.<sup>295</sup>

**Figure 32: Total Debt / Market Capitalization: Alphabet and comparable companies, 2013-2023**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Alphabet Inc.	0.02x	0.02x	0.01x	0.01x	0.01x	0.01x	0.02x	0.02x	0.01x	0.03x	0.02x
Peers: 25th percentile	0.01x	0.04x	0.02x	0.04x	0.02x	0.02x	0.03x	0.04x	0.03x	0.05x	0.03x
S&P 500: median company	0.05x	0.06x	0.06x	0.10x	0.15x	0.16x	0.10x	0.11x	0.12x	0.14x	0.28x

Source: S&P Capital IQ.

<sup>292</sup> This includes \$17 billion in long-term leases, with the remaining \$12.9 billion as long-term debt. See, S&P Capital IQ, Alphabet Inc, Balance Sheet, accessed August 29, 2024.

<sup>293</sup> S&P Capital IQ, Alphabet Inc, Historical Capitalization, accessed August 29, 2024; Alphabet Inc., *Form 10-K 2023*, January 30, 2024, 42.

<sup>294</sup> See my backup for details.

<sup>295</sup> Moody's, "Alphabet Inc. LT Issuer Ratings & Assessments," accessed August 29, 2024, <https://www.moody's.com/credit-ratings/Alphabet-Inc-credit-rating-824906971/ratings/view-by-class>; See also Moody's, "Rating Scale and Definitions," accessed September 4, 2024, [https://www.moody's.com/sites/products/productattachments/ap075378\\_1\\_1408\\_ki.pdf](https://www.moody's.com/sites/products/productattachments/ap075378_1_1408_ki.pdf).

## IX. Conclusion

(170) In summary, based on the foregoing, I conclude that Dr. Wiggins's and Dr. Skinner's opinions regarding the scope and effect of the conduct at issue, the number of statutory violations, the benefits to Google, the amount of appropriate penalties, and the financial impact of potential penalties on Google are without merit. Contrary to their opinions, I conclude the following:

- First, from a methodological perspective, Dr. Wiggins focuses only on measuring the incremental benefits to Google from the alleged conduct.<sup>296</sup> On the contrary, from an economic perspective, an appropriate deterrent amount should consider the total amount of harm, the total amount of benefit, and the probability of detection; the latter factor in particular will result in a deterrent penalty many multiples of the actual or expected benefit to Google or harm to society (including harm to publishers, advertisers, competitors, consumers, and the competitive process).
- Second, from a methodological perspective, Dr. Wiggins ignores the extensive academic literature on the "principal-agent" problem, which suggests that an appropriate deterrent penalty should account for the principal-agent problem inherent in Alphabet's corporate governance; and if the jury concludes that the conduct at issue is sufficiently severe and extensive, the deterrent penalty should be set sufficiently high to have at least some measurable impact on Alphabet's stock price.
- Third, Dr. Wiggins focuses in his penalty analysis only on the incremental profits earned by Google from its AdX business in the Plaintiff States.<sup>297</sup> By contrast, I conclude that the relevant amount of commerce impacted by the conduct at issue is far greater, ranging between [REDACTED] and potentially \$1.38 trillion in Google booked revenue, and between [REDACTED] in Google operating profit, depending on whether the conduct only affected Google's DVAA business, or if it affected more broadly Google's advertising business on its own properties, including YouTube, Gmail, and Search, for example.
- Fourth, Dr. Wiggins concludes that the conduct at issue resulted in at most 579 billion violations.<sup>298</sup> In contrast, I conclude that approximately [REDACTED] were likely affected by Google's conduct at issue; and depending on what specific conduct the jury determines to be a violation of the relevant statutes, the number of Google's statutory violations in the Plaintiff States may be 7.7 trillion. Even if one were to accept Dr. Wiggins's estimate of 579 billion transactions, it would not affect the appropriate deterrent penalty amount, given the scope and severity of the conduct at issue.

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<sup>296</sup> Wiggins Report, ¶ 121.

<sup>297</sup> Wiggins Report, Section VII.

<sup>298</sup> Wiggins Report, Table 1.

- Fifth, Dr. Wiggins concludes that appropriate penalties should be between \$22 million and \$141 million, although he ultimately concludes they should be zero, since Google was unable to benefit from the conduct.<sup>299</sup> In contrast, using Google's own estimates of the expected benefits from the conduct at issue, and applying reasonable estimates of the probability of detection, enforcement, and penalty collection, I calculate deterrent penalties in the range of between \$14.8 billion and \$124.4 billion as of June 2025; or between \$10.7 billion and \$75.9 billion, assuming a 20-year limited duration of the expected benefits; or between \$9.6 billion and \$43.7 billion, if based on the expected realized benefits of the programs over the years at issue. A reasonable fact finder could determine that the appropriate penalty is within these ranges or, potentially, even higher, particularly in light of the other factors that the jury may consider in keeping with statutory guidance. While the methodology described above provides wide ranges of potential deterrent penalty amounts, due in large part to the impact of alternative assumptions regarding the probability of detection, enforcement, and penalty collection, I consider a 20% probability to provide a reasonable basis with which to derive a mid-point estimate for those ranges.
- Sixth, Dr. Wiggins concludes that Google's prior conduct, and the penalties associated with that conduct, are irrelevant to determining the appropriate penalty amount in this case.<sup>300</sup> In contrast, I conclude that based on a statistical analysis of the impact of prior penalty amounts on Google's stock price, and given the substantial scope, extent, and profitability of the conduct at issue, a penalty would need to be in the range of \$12 billion to \$25 billion, and likely higher, to have a sufficiently detectable impact on the company's stock price to deter Google and similarly situated companies from engaging in similar conduct in the future.
- Seventh and finally, Dr. Skinner concludes that Google's stock repurchases, R&D activities, and other factors do not support the conclusion that a \$29 billion penalty could be imposed on the company without significant ramifications.<sup>301</sup> In contrast, I conclude that based on Google's profitability, its cash from operations, its excess cash on hand, the value of its stock repurchases, and its borrowing capacity, deterrent penalties of \$50 billion, or more, would not adversely affect the company's current operations, its R&D activities, its ability to make additional capital investments, or its access to capital markets.

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<sup>299</sup> Wiggins Report, ¶ 19, Figure 3.

<sup>300</sup> Wiggins Report, § VII.C.

<sup>301</sup> Skinner Report, § X.

**HIGHLY CONFIDENTIAL** - Expert Report of David W. DeRamus, Ph.D.

  
\_\_\_\_\_  
David W. DeRamus, Ph.D.

September 9, 2024

\_\_\_\_\_  
Date

## Appendix A. Curriculum vitae of David DeRamus

### A.1. Summary of experience

David W. DeRamus is a founding member of Bates White Economic Consulting and is active in the firm's Antitrust and Competition, Energy, Finance, International Arbitration and Trade, and Transfer Pricing and Tax Practices. He specializes in economic and financial analysis, quantitative modeling, antitrust analysis, pricing analysis, damages analysis, and valuation. Dr. DeRamus has an extensive background in industrial organization, international economics, antitrust economics, microeconomics, finance, financial modeling, and statistics.

### A.2. Education

- PhD, Economics, University of Massachusetts at Amherst
- MA, Economics, University of Massachusetts at Amherst
- BA, Political Science (*magna cum laude*), Duke University

### A.3. Professional Experience

- Dr. DeRamus was previously a Manager with A.T. Kearney and a Senior Manager with KPMG. In both positions, he had broad client responsibility including the management of complex litigation, transfer pricing, and business consulting engagements.

### A.4. Last ten years of deposition and trial testimony (see selected experience for more details)

- On behalf of the State of Texas, served as economic expert in *State of Texas v. Meta Platforms, Inc. fka Facebook, Inc.*, Cause No. 22-0121, District Court 71st Judicial District, Harrison County, Texas.
- On behalf of the South Carolina Department of Revenue, served as economic expert in *Home Depot USA, Inc. v. South Carolina Department of Revenue* (State of South Carolina Administrative Law Court, Docket No. 22-ALJ-17-0176-CC).

- On behalf of the South Carolina Department of Revenue, served as economic expert in *CarMax Auto Superstores, Inc. v. South Carolina Department of Revenue* (State of South Carolina Administrative Law Court, Docket No. 21-ALJ-17-0182-CC).
- On behalf of Plaintiffs, served as economic expert in *Liu Chin Mei, Tong-Schung Tai and Robert Shi, as Executors of the Will of Yueh-Lan Wang v. New Mighty U.S. Trust, New Mighty Foundation, and Clearbridge LLC*, U.S. District Court for the District of Columbia (Civil Action No. 1:10-cv-01743 (JEB)).
- On behalf of the US Internal Revenue Service, served as economic expert in *Western Digital Corporation and Subsidiaries v. Commissioner of Internal Revenue*, U.S. Tax Court (Docket Nos. 18984-18, 4818-19).
- On behalf of the U.S. Department of Justice, served as economic expert in *Perrigo Company and Subsidiaries v. United States of America*. U.S. District Court, Western District of Michigan (No. 1:17-cv-00737).
- On behalf of the Debtors, served as economic expert in *In re Purdue Pharma L.P.*, U.S. Bankruptcy Court, Southern District of New York (Case No. 19-23649).
- On behalf of the South Carolina Department of Revenue, served as economic expert in *Tractor Supply Company v. South Carolina Department of Revenue* (State of South Carolina Administrative Law Court, Docket No. 20-ALJ-17-0416-CC).
- On behalf of the South Carolina Department of Revenue, served as economic expert in *AutoZone Investment Corporation v. South Carolina Department of Revenue* (State of South Carolina Administrative Law Court, Docket No. 20-ALJ-17-0068-CC).
- On behalf of Radwell International, served as economic expert in *Rockwell Automation v. Radwell International*, U.S. District Court, District of New Jersey (15-cv-05246 (RBK) (JS)).
- On behalf of Radwell International, served as economic expert in *In the Matter of Certain Programmable Logic Controllers, Components Thereof, and Products Containing Same*, International Trade Commission Investigation No. 337-TA-1105.
- On behalf of the State of Mississippi, served as economic expert in *The State of Mississippi, Ex Rel. Jim Hood, Attorney General for the State of Mississippi v. Entergy Mississippi, Inc., et al.* in U.S. District Court for the Southern District of Mississippi (Civil Action No. 3:08cv780-CWR-LRA).
- On behalf of the Electric Power Supply Association et al., submitted declaration in *Electric Power Supply Association et al. v. Anthony M. Starr et al.* (U.S. District Court for Northern District of Illinois Eastern Division, Case No. 17-cv-01164).
- On behalf of the Electric Power Supply Association, submitted an affidavit in proceedings before the Federal Energy Regulatory Commission ("FERC") in *PJM Interconnection, L.L.C.* (FERC Docket No. RM18-1314-000).



- Submitted affidavit in proceedings before the FERC related to Grid Reliability and Resilience Pricing (FERC Docket No. RM18-1-000).
- On behalf of Trans Ova Genetics, served as economic expert in *XY, LLC v. Trans Ova Genetics LLC* (United States District Court for the District of Colorado, Case No. 1:13-cv-00876-WJM-NYW).
- On behalf of Nest Labs, served as economic expert in *Allure Energy, Inc. v. Nest Labs, Inc.*, Civil Action No. 9–13–CV–102, 84 F. Supp. 3d 538, (E.D. Tex. 2015).
- On behalf of Vote Solar, served as economic expert in *In the Matter of the Investigation of the Costs and Benefits of PacifiCorp's Net Metering Program* before the Public Service Commission of Utah (Docket No. 14-035-184).
- On behalf of the Energy Freedom Coalition of America, served as economic expert in proceedings before the Arizona Corporation Commission (*In the Matter of the Application of Tucson Electric Power Company for the Establishment of Just and Reasonable Rates and Charges Designed to Realize a Reasonable Rate of Return on the Fair Value of the Properties of the Tucson Electric Power Company Devoted to its Operations Throughout the State of Arizona and for Related Approvals; and In the matter of the Application of Tucson Electric Power Company for Approval of its 2016 Renewable Energy Standard and Tariff Implementation Plan*; Docket No. E-01933A-15-0322).
- On behalf of Pluspetrol Peru Corporation S.A. and others, served as economic expert before the International Center for Settlement of Investment Disputes in *Pluspetrol Peru Corporation S.A. and others v. Perupetro S.A.* (ICSID Case No. ARB/12/28).

## A.5. Selected litigation experience

- On behalf of the State of Texas, served as economic expert in *State of Texas v. Meta Platforms, Inc. fka Facebook, Inc.*, Cause No. 22-0121, District Court 71 st Judicial District, Harrison County, Texas. Testified on the economic benefits to Meta of facial recognition technology, quantified the extent to which it applied facial recognition technology to images of Texas residents, and addressed other issues related to alleged violations of the Texas Capture or Use of Biometric Identifier ("CUBI") Act and Deceptive Trade Practice Act ("DTPA").
- On behalf of Plaintiffs, served as economic expert in *Liu Chin Mei, Tong-Schung Tai and Robert Shi, as Executors of the Will of Yueh-Lan Wang v. New Mighty U.S. Trust, New Mighty Foundation, and Clearbridge LLC*, U.S. District Court for the District of Columbia (Civil Action No. 1:10-cv-01743 (JEB)). Testified on valuation issues related to a petrochemical business.
- On behalf of the US Internal Revenue Service, served as economic expert in *Western Digital Corporation and Subsidiaries v. Commissioner of Internal Revenue*, U.S. Tax Court (Docket Nos.

18984-18, 4818-19). Testified on transfer pricing issues related to the hard-disk drive (HDD) business; analyzed the development and value of HDD technology; and determined arm's-length pricing for various intercompany transactions.

- On behalf of the U.S. Department of Justice, served as economic expert in *Perrigo Company and Subsidiaries v. United States of America*. U.S. District Court, Western District of Michigan (No. 1:17-cv-00737). Testified on transfer pricing issues, the structuring of certain related party transactions, and the economic effects of those transactions. Analyzed economic issues related to the development of over-the-counter omeprazole, the value of that business, and the determination of arm's-length prices for related-party transactions associated with that business.
- Served as economic expert on transfer pricing issues in the Purdue Pharma Chapter 11 proceedings (*In re Purdue Pharma L.P.*, U.S. Bankruptcy Court, Southern District of New York, Case No. 19-23649). On behalf of the Debtors, analyzed the value of intercompany transfers between Purdue Pharma and the Independent Associated Companies ("IACs") and other Sackler-owned entities. Analyzed intellectual property licenses, intellectual property rights transfers, manufacturing services, finished goods transfers, active pharmaceutical ingredients ("API") transfers, R&D services, administrative services, real estate transactions, and transfers of equity interests in third parties and other related party companies.
- On behalf of the South Carolina Department of Revenue, testified on transfer pricing issues in *Home Depot USA, Inc. v. South Carolina Department of Revenue* (State of South Carolina Administrative Law Court, Docket No. 22-ALJ-17-0176-CC). Analyzed related-party transactions involving headquarters services, procurement, merchandising, trademarks, intercompany loans, and retail operations; analyzed related party restructuring.
- On behalf of the South Carolina Department of Revenue, testified on transfer pricing issues in *CarMax Auto Superstores, Inc. v. South Carolina Department of Revenue* (State of South Carolina Administrative Law Court, Docket No. 21-ALJ-17-0182-CC). Analyzed related-party transactions involving headquarters services, auto financing, trademarks, and other asserted intangible assets; analyzed valuation of intangible assets as part of a related party restructuring.
- On behalf of the South Carolina Department of Revenue, testified on transfer pricing issues in *Tractor Supply Company v. South Carolina Department of Revenue* (State of South Carolina Administrative Law Court, Docket No. 20-ALJ-17-0416-CC). Analyzed related-party transactions involving tangible goods, headquarters services, and trademarks.
- On behalf of the South Carolina Department of Revenue, testified on transfer pricing issues in *AutoZone Investment Corporation v. South Carolina Department of Revenue* (State of South Carolina Administrative Law Court, Docket No. 20-ALJ-17-0068-CC). Analyzed related-party transactions involving tangible goods, headquarters services, financing, and trademarks.

- Submitted expert report in proceedings before the American Arbitration Association in a contract dispute related to a retail business and the sale of property to the U.S. government. Analyzed the impact of certain contractual provisions in a partnership agreement on the appropriate distribution of proceeds from the sale of property; and assessed the value of different components of related retail businesses.
- Serving as a consulting expert in several ongoing matters related to cryptocurrencies, cryptocommodities, and other digital assets, including allegations of market manipulation and other causes of action.
- Served as testifying expert on antitrust issues and damages in *Rockwell Automation v. Radwell International*, U.S. District Court, District of New Jersey (15-cv-05246 (RBK) (JS)), a case involving Lanham Act trademark infringement claims and antitrust counterclaims.
- *In the Matter of Certain Programmable Logic Controllers, Components Thereof, and Products Containing Same*, International Trade Commission Investigation No. 337-TA-1105, submitted expert report on antitrust issues, including relevant market definition, monopoly power, anticompetitive conduct, imports, and injury to a domestic industry. Also analyzed alleged trademark infringement.
- Testified at trial in *XY, LLC v. Trans Ova Genetics LLC*, a patent infringement and antitrust dispute in the livestock reproductive services industry. Testified on behalf of Counterclaim Plaintiff Trans Ova Genetics on issues related to relevant market definition, monopoly power, anticompetitive conduct, and damages.
- Testified at trial in *ZF Meritor LLC v. Eaton Corp.*, a monopolization case involving heavy-duty truck transmissions. On behalf of plaintiffs, submitted testimony defining the relevant antitrust market, assessing whether a market participant had monopoly power, and evaluating the harm to competition from certain contracts and the performance of those contracts; also submitted testimony estimating damages. Jury verdict on liability in favor of client, upheld on appeal (*ZF Meritor v. Eaton Corp.*, 696 F.3d 254 (3d Cir. 2012), cert denied, 133 S.Ct. 2025 (2013)). Prior to the damages phase of trial, the parties agreed to a \$500 million settlement.
- Served as consulting expert in international trade dispute before the World Trade Organization. Analyzed the industry and markets at issue, assessed impact of certain government support programs on that country's industry, and evaluated potential impact of such programs on another country's domestic and export commerce. Analyzed economic evidence of serious prejudice, adverse effects, and injury resulting from the alleged subsidies.
- In *The State of Mississippi, Ex Rel. Jim Hood, Attorney General for the State of Mississippi v. Entergy Mississippi, Inc.*, et al. in U.S. District Court for the Southern District of Mississippi (Civil Action No. 3:08cv780-CWR-LRA), submitted testimony related to Entergy's alleged failure to

purchase adequate amounts of lower-cost electric power from third parties. Evaluated Entergy's conduct and estimated damages.

- Submitted expert testimony in *In re Methionine Antitrust Litigation*, a major price-fixing case involving feed additives on behalf of direct action opt-out plaintiffs. Issues included establishment of liability, estimation of damages, analysis of industry structure, analysis of financial performance, and other pricing-related issues.
- Submitted declaration on behalf of independent power producer Plaintiffs in *Electric Power Supply Association et al. v. Anthony M. Starr et al.* (U.S. District Court for Northern District of Illinois Eastern Division, Case No. 17-cv-01164), a dispute arising from a state subsidy program for certain nuclear generating units that otherwise would have retired. Analyzed the impact of the subsidies on wholesale market prices; irreparable harm to markets and consumers; and undue in-state preferences.
- Served as a Technical Expert in a contract dispute between two petrochemical companies in administered expert proceedings before the International Chamber of Commerce (ICC)/International Centre for ADR. The scope of the assignment was to determine an appropriate reference price to be used by the Parties for the remaining period of a long-term supply contract.
- Served as testifying expert before the International Center for Settlement of Investment Disputes in a royalty dispute involving a major natural gas extraction and LNG project in Latin America. The LNG produced from the project was exported to customers in Mexico, the U.S., and other global natural gas markets. Testified on behalf of a consortium of producers on issues related to the economics of the contract, industry practices, the impact on the parties of recent developments in global natural gas markets, the commercial causes and consequences of "re-exports" from certain global LNG terminals, the appropriate calculation of royalties, and damages.
- Submitted a declaration in *Allure Energy, Inc. v. Nest Labs, Inc.* on behalf of defendant Nest Labs. Performed economic analysis of the four eBay factors to assess whether a preliminary injunction against Nest Labs should be granted for alleged patent infringement. Plaintiff's request for a preliminary injunction was denied.
- Testified in proceedings before the American Arbitration Association in a contract dispute between chemical manufacturers. Testified on issues related to the economics of the contract, the value to the parties of the contract, the impact of foreign exchange rate changes on the value of the contract, the competitive alternatives available to the parties, and damages.
- Testified in proceedings before the American Arbitration Association in a contract dispute between defense contractors. Testified on issues related to the materiality of the failure to

disclose a government investigation, the economic analysis of a subcontract and alleged joint venture agreement, and damages.

- Served as consulting expert in international arbitration proceedings (International Chamber of Commerce) related to a dispute in the pharmaceutical industry. Estimated damages associated with the alleged breach of contract.
- Submitted expert testimony in *T.E. Security Consultants v. DynCorp Int'l*, a contract dispute between defense contractors. Testified on issues of the financial ability of one of the parties to perform on a contract, a party's ability to obtain financing, the economic analysis of an alleged subcontract, the value of alleged trade secrets, and damages.
- Submitted testimony and testified at hearing in *Jenkins v. Entergy Corp.* estimating damages to plaintiffs resulting from an alleged improper energy purchasing scheme; submitted testimony in class certification proceeding.
- Testified on behalf of the Maryland Public Service Commission Staff to assess potential market power issues associated with the proposed merger of Exelon Corporation and Constellation Energy Group, Inc. Analyzed changes in market concentration, the definition of relevant geographic markets, and Applicants' proposed mitigation plan. Assessed the economic viability of the facilities selected for divestiture by the Applicants. Provided testimony on the Applicants' proposal to build additional generation as a means of addressing market power concerns raised by the proposed merger.
- Testified on behalf of the Energy Freedom Coalition of America before the Arizona Corporation Commission regarding a proposal by Tucson Electric Power Company related to residential distributed generation (DG) and the Arizona Renewable Energy Standard and Tariff. Analyzed the impact of proposed tariff changes on customers and competition.
- Submitted expert testimony on behalf of indirect purchaser plaintiffs in class certification proceedings in *J&R Ventures, Inc. v. Rhone-Poulenc SA*, a price-fixing case involving feed additives.
- Submitted testimony on behalf of Constellation Energy Commodities Group, Inc., in a complaint proceeding before FERC (Docket No. EL07-47-000) brought by the Illinois Attorney General against various participants in the Illinois Auction for electric power supplies held in September 2006. Analyzed issues related to the competitiveness of the auction structure, market concentration, the ability of the participants to exercise market power, and allegations of collusion.
- Submitted expert report to FERC related to alleged market manipulation in energy markets.
- Served as consulting expert on behalf of plaintiffs for monopolization cases involving the computer software industry. Assisted with the development of overall case strategy and preparation of economic analysis used in legal filings, analyzed pricing issues, investigated and

reviewed allegations of anticompetitive behavior, prepared damage estimates, submitted damage reports to clients, and assisted with settlement negotiations.

- Served as consulting expert on behalf of multiple defendants in several large cases related to the natural gas industry on class certification and damages issues. Alleged conduct involved misreporting of prices to publishers of natural gas price indices.
- Served as consulting expert on antitrust, pricing, and exclusionary conduct issues related to biotechnology and agricultural products. Analyzed potential anticompetitive harm resulting from a proposed acquisition.
- Provided economic analyses related to antitrust issues involving the electric utility industry. Analyzed prices, load patterns, capacity issues, outages, bidding patterns, and allegations of anticompetitive behavior.
- Submitted various expert reports in transfer pricing disputes before the Mexican tax authority (Servicio de Administración Tributaria) related to transfer pricing. These reports evaluated whether various related-party transactions were consistent with the arm's length standard under OECD and Mexican transfer pricing guidelines.
- Served as consulting expert services to the U.S. Department of Justice in a major government contract dispute. Assessed the economics of a development contract with defense aerospace companies. Analyzed the contractors' financial performance and viability, bankruptcy risks, potential financing sources, project cash flows, and the impact of contract termination.
- Assessed reliability of statistical study related to pricing accuracy for a large retailer. Analyzed issues related to overall study methodology, sampling bias, and quantification of harm to consumers.
- Testified in *Delaware Chancery Court in Frontier Oil Corp. v. Holly Corp.*, a merger-related dispute in the energy industry. Testimony involved the valuation of a potential environmental liability/toxic tort arising from oil and gas operations, including an assessment of the materiality of the liability to the proposed merger.
- Submitted expert testimony in government procurement litigation matter involving office productivity software. Analyzed financial costs and benefits of software standardization initiative, reviewed product comparisons, analyzed data on software installation and use, evaluated claims regarding alleged product integration and standardization advantages, and analyzed market consequences of government procurement decisions.
- Submitted expert testimony assessing the damages resulting from defamation in the travel retail industry.

- Developed a state-of-the-art microsimulation model for estimating the future liability of former asbestos manufacturers from personal injury lawsuits. Developed several financial cash-flow models to determine long-term viability of product liability settlement trusts.
- Conducted several valuation studies related to potential future product liability and potential future litigation recoveries. Valuation reports prepared and submitted as part of the acquisition process for due diligence and tax reporting purposes.
- Provided project oversight for estimation of damages in patent infringement case in the financial services industry. Damages estimated based on a reasonable royalty methodology.
- Conducted a valuation of a plaintiff's legal claims related to several ongoing major litigation matters. Valuation report submitted for tax reporting purposes.
- Analyzed the impact of a private-label credit card on a large retailer's sales and profits in a major tax dispute. Developed a robust statistical model using the company's point-of-sale data, credit card data, and customer demographic information. Tax dispute resolved in favor of the client based on this analysis.
- Conducted market and industry analyses for various due diligence, breach of contract, bankruptcy, and product liability engagements in the areas of insurance, general aviation, commercial property, electronic funds transfer, restaurant franchising, and construction.

## A.6. Selected energy regulatory experience

- Submitted an affidavit on behalf of the Electric Power Supply Association in *PJM Interconnection, L.L.C.* (FERC Docket No. RM18-1314-000). Evaluated PJM's proposed modifications to its auction market rules to address market distortions caused by the participation of subsidized resources in PJM's capacity market.
- Submitted affidavit in FERC Proceeding related to Grid Reliability and Resilience Pricing (Docket No. RM18-1-000). Responded to DOE's proposal to subsidize uneconomic coal and nuclear units.
- Submitted testimony on behalf of Vote Solar in proceedings before the Public Service Commission of Utah regarding the costs and benefits of distributed solar generation. Responded to Rocky Mountain Power's proposed changes to the Utah residential Net Energy Metering (NEM) program.
- Testified on behalf of Florida Power & Light Company in proceedings before the Florida Public Service Commission regarding the potential impact on residential and commercial customers of a proposed base rate increase.
- Testified on behalf of Tenaska and Coral Power in proceedings before the Public Utility Commission of Texas (PUC Docket No. 33687) related to the application by Entergy Gulf States,



Inc., of its “Transition to Competition Plan.” Analyzed issues related to Entergy’s business strategy, cost-benefit analysis, cost allocation, cross-subsidization, and potential harm to competition.

- Submitted testimony on behalf of Occidental Chemical Company in FERC proceedings (Docket No. ER10-396-000) related to the application by Tres Amigas for authorization to sell transmission services at negotiated rates. Analyzed potential market power issues raised by the application.
- Submitted testimony on behalf of the NRG Companies in FERC proceedings (Docket No. ER08-1209-000) related to the proposal by ISO New England Inc. and the New England Power Pool Participants Committee to compensate rejected Dynamic and Static De-List Bids in the ISO-NE Forward Capacity Auction.
- Submitted testimony on behalf of Milford Power Company, LLC, in FERC proceedings (Docket No. ER99-4102-\_\_\_) related to the Commission’s generation market power screens as applicable to Milford’s market-based rate authority.
- Testified on behalf of the New York Power Authority in FERC proceedings (Docket No. ER06-456-000, et al.) related to the proposal by PJM Interconnection, LLC, to allocate cost responsibility for certain transmission network upgrades included in the baseline PJM Regional Transmission Expansion Plan to merchant transmission projects that interconnect with the PJM transmission network.
- Submitted testimony on behalf of Southaven Power and Kelson Energy III in FERC proceedings (Docket No. EC08-\_\_\_-000) related to potential market power issues arising from Kelson’s proposed acquisition of the Southaven generation facility. Submitted testimony on behalf of Kelson Energy III in FERC Docket No. ER08-\_\_\_-000 related to the Commission’s generation market power screens as applicable to Kelson’s application for market-based rate authority.
- Testified on behalf of Shell Trading Gas and Power Company and Calpine Corp. in proceedings before FERC (Docket Nos. ER97-4166-015, EL04-124-000, et al.) related to the application by the Southern Companies for market-based rate authority. Analyzed issues related to the appropriate implementation of the Commission’s Delivered Price Test, generation market power, Southern Companies’ transmission network, barriers to entry, and affiliate preferences.
- Submitted comments in proceedings before the Federal Energy Regulatory Commission (FERC) (Docket Nos. RM07-19-000 and AD07-7-000) related to “Wholesale Competition in Regions with Organized Electric Markets” (see “Comments of the Electric Power Supply Association”). Analyzed economic issues related to FERC’s demand response proposals.
- Submitted testimony on behalf of Occidental Chemical Company in FERC proceedings (Docket No. EC07-70-000) evaluating the proposed acquisition of jurisdictional assets of Calcasieu Power,

LLC, by Entergy Gulf States, Inc. Analyzed issues related to the impact of the acquisition on market concentration and the ability of the applicant to exercise market power.

- Testified on behalf of the Texas Industrial Energy Consumers in proceedings before the Public Utility Commission of Texas (SOAH Docket No. 473-06-2536 and PUC Docket No. 32766) related to the retail electric power rates charged by Southwestern Public Service Company. Analyzed issues associated with the appropriate allocation of average system fuel costs and cross-subsidization.
- Testified on behalf of BP Canada Energy Marketing Corp. and IGI Resources, Corp., in FERC proceedings (Docket No. RP06-407) related to the application by Gas Transmission Northwest Corporation for market-based rate authority and flexible services rates for certain transportation services provided by the GTN natural gas pipeline.
- Testified on behalf of Occidental Permian Ltd. and Occidental Power Marketing, L.P., in FERC proceedings (Docket No. EL05-19-002 and ER05-168-001) related to the wholesale electric power rates charged by Southwestern Public Service Company. Analyzed issues associated with the appropriate allocation of average system fuel costs and cross-subsidization.
- Submitted testimony on behalf of Occidental Permian Ltd. and Occidental Power Marketing, L.P., in FERC proceedings (Docket No. ER01-FY205-009, et al.) related to the application by Southwestern Public Service Company for market-based rate authority. Analyzed issues related to generation market power and affiliate abuse.
- Submitted testimony on behalf of Calpine Corp. in FERC proceedings (Docket No. ER05-1065-000) and Louisiana Public Service Commission proceedings (Docket No. U-28155) related to the application by Entergy Services, Entergy Louisiana, and Entergy Gulf States, to establish an Independent Coordinator of Transmission. Analyzed the functions to be performed by the ICT, Entergy's transmission pricing proposal, and its Weekly Procurement Process proposal.
- Submitted testimony on behalf of Calpine Corp. in proceedings before the Louisiana Public Service Commission (Docket No. U-27836) related to the application by Entergy Louisiana, Inc., and Entergy Gulf States, Inc., for approval of the purchase of the Perryville, La., electric generating facility. Analyzed issues of market power and calculated the extent to which the proposed transaction increased market concentration.
- Submitted expert testimony on behalf of Duke Energy in response to a FERC Show Cause Order (Docket No. EL03-152-000) relating to alleged "gaming" behavior in the California power markets.
- Submitted testimony on behalf of Calpine Corp. and Occidental Chemical Corp. in FERC proceedings (Docket No. ER91-569-023) related to the application by Entergy Services for market-based rate authority. Analyzed issues of generation market power, transmission market power, barriers to entry, and affiliate abuse in the Entergy control area. Implemented a model of

the Entergy control area transmission constraints in performing the generation market power analysis.

- Submitted testimony on behalf of Calpine Corp. in FERC proceedings (Docket No. ER96-2495-018, et al.) related to the application by AEP Power Marketing, Inc., et al., for market-based rate authority. Analyzed issues of generation market power, transmission market power, barriers to entry, and affiliate abuse in the AEP-SPP control area.
- Submitted expert testimony on behalf of InterGen in FERC proceedings (Docket No. EC03-131-000) related to Oklahoma Gas & Electric's proposed acquisition of NRG McClain. Analyzed issues of horizontal and vertical market power for a hearing to identify appropriate mitigation measures.
- Submitted expert testimony on behalf of the Independent Energy Producers Association on vertical market power in FERC proceedings (Docket No. ER04-316-000) related to Southern California Edison's proposed acquisition of a Mountainview, California, electricity generating facility and a subsequent inter-affiliate Power Purchase Agreement.
- Submitted report for the Independent Energy Producers Association regarding the market price referent methodology for use in California Renewables Portfolio Standards power solicitations in proceedings before the California Public Utilities Commission (Docket No. OIR 01-10-024).
- Submitted expert testimony on behalf of Duke Energy in FERC proceedings (Docket Nos. EL00-95-075 and EL00-98-063) related to the California power markets during 2000–2001 and allegations of improper bidding behavior. Analyzed detailed data on individual bids and plant-level generation, performed statistical analysis of “physical” and “economic” capacity withholding, analyzed financial market data, examined alleged evidence of manipulative trading strategies, and assessed evidence of coordinated behavior.

## **A.7. Selected business consulting experience**

- Assisted pharmaceutical company in assessing intellectual property-related issues as part of an acquisition, and in assessing royalties for certain intellectual property in potential licensing transactions.
- Prepared numerous transfer pricing analyses on behalf of large automotive manufacturers, used for documentation, planning, and audit on a global basis. Evaluated policies and pricing for related-party transactions with respect to the arm's length standard under US, Mexico, OECD, and other country guidelines. Analyzed transfer pricing issues related to finished vehicles, engines, transmissions, other components, royalties, and services. Developed cost-sharing arrangements; assisted in bringing consistency across documentation studies prepared for different tax jurisdictions; addressed issues related to Advance Pricing Agreements and

Competent Authority proceedings; and in audit and controversy proceedings, rebutted the transfer pricing analyses of various tax authorities.

- Submitted comments to various government agencies regarding the cost-effectiveness of biodiesel as a means of reducing CO2 emissions from transportation fuels.
- Authored a report on the US ethanol industry, quantifying the impact of the expiration of the Voluntary Ethanol Excise Tax Credit (VEETC) and a tariff on US ethanol imports.
- Estimated value of automotive engine technology for large international automotive manufacturer. Study prepared for tax and financial reporting purposes.
- Conducted numerous transfer pricing studies for tax planning, documentation, and audits. Clients include large multinational companies involved in automotive manufacturing, pharmaceutical preparations, medical products, computer software/hardware, industrial equipment, retail clothing, food products, tobacco, alcoholic and non-alcoholic beverages, oil drilling services, package delivery services, shipping, and industrial products.
- Designed, managed, and implemented intellectual property-related planning initiatives for large multinational clients in manufacturing, computer, telecommunications, and consumer product industries. Designed R&D cost sharing arrangements and prepared transfer pricing documentation for tax compliance.
- Estimated value of liabilities for a remainder trust established for a former manufacturer of food products. Potential liabilities were related to environmental remediation costs associated with a “Superfund” site containing hazardous waste.
- Managed the development of advanced data analytic software based on artificial neural networks for financial services client. Responsible for identifying new product opportunities for client, evaluating feasibility of applications, performing cost-benefit analysis for new product investment, designing implementation plan, and managing the overall software development process.
- Estimated the future asbestos liability of several companies (public and private) for investment research firms and potential acquirers as due diligence. Analyzed the litigation risks faced by the companies, insurance coverage issues, potential consequences of other developments in the asbestos litigation environment, and financial reporting issues.
- Conducted extensive empirical research on the impact of R&D and advertising on profitability; analyzed the impact of foreign exchange rate fluctuations on US prices.
- Analyzed economic issues on behalf of the Electric Power Supply Association with respect to demand response programs and price caps in organized electric markets in FERC Docket Nos. RM07-19-000 and AD07-7-000 (“Wholesale Competition in Regions with Organized Electric Markets”).

- Prepared a quantitative analysis of the benefits of competitive electric wholesale markets on behalf of an energy company.
- Prepared a whitepaper on the use of competitive procurements as a means of reducing market power in wholesale electric markets on behalf of an energy company.
- Submitted a report on behalf of the Independent Energy Producers Association regarding the proposed market price referent methodology for use in the California Renewables Portfolio Standards power solicitations in proceedings before the California Public Utilities Commission (Docket No. OIR 01-10-024).
- Developed a financial simulation model for a major transportation consortium in contract negotiations with the US Department of Defense to determine the appropriate compensation for risk in a long-term supply contract.
- Managed and directed various business consulting projects requiring statistical analysis to guide pricing and marketing decisions.
- Provided strategy consulting to seed-stage start-up companies, including development of business strategy, competitive analysis, intellectual property assessment, development of revenue and cost projections, and formulation of business and financing plan.
- Conducted an antidumping study to estimate exposure to tariffs in the petrochemical industry.

## **A.8. Related activities and honors**

- German Academic Exchange Service Grant (awarded)
- Council for European Studies Pre-Dissertation Fellowship (Columbia University)
- Dean's University Fellowship (University of Massachusetts)
- Herbert Lehman Fellowship (New York State)

## **A.9. Languages**

- French (fluent)
- German (fluent)
- Spanish (intermediate)

## Appendix B. Materials relied upon

In addition to all materials below, I incorporate by reference all materials used or cited in footnotes and analyses.

### B.1. Legal and other case documents

- 15 U.S.C. § 15 (2023)
- 18 U.S.C. § 1964 (2023)
- Alaska Stat § 45.50 (2023)
- Arkansas Code § 4-88 (2023)
- Expert Report of Douglas Skinner (July 30, 2024), backup materials and all cited documents.
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- Indiana Code § 24-5 (2023).
- Kentucky Rev Stat §§ 367.110 - 367.990 (2023)
- Laws of Puerto Rico § 259 (2023)
- Mississippi Code § 75-24 (2023)
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- Montana Code § 30-14 (2023)
- Nevada Rev Stat § 598 (2023)
- North Dakota Century Code § 51-15 (2023)

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- South Dakota Code § 37-24 (2023)
- Utah Code § 13-11 (2023)

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## B.5. Data

- Bloomberg.
- S&P Capital IQ.

## B.6. Depositions

- Deposition of Nirmal Jayaram, April 26, 2024.
- Deposition of Nirmal Jayaram, July 10, 2024.
- Deposition of Nitish Korula, May 3, 2024.

## B.7. Bates numbered documents

- FBDOJGOOG\_01186933.
- GOOG-AT-MDL-B-001114919.
- GOOG-AT-MDL-B-004435235.
- GOOG-DOJ-28385887.

**HIGHLY CONFIDENTIAL** - Expert Report of David W. DeRamus, Ph.D.

- GOOG-DOJ-29803801.
- GOOG-DOJ-32280412.
- GOOG-DOJ-AT-00221276.
- GOOG-DOJ-AT-01510462.
- GOOG-NE-03872763.
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- GOOG-NE-04597999.
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- GOOG-NE-07249237.
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- GOOG-NE-11275306
- GOOG-NE-13234466.
- GOOG-TEX-00635680.GOOG-TEX-00831090.

## Appendix C. Materials Considered

### C.1. Pleadings

- The live pleadings (complaint and answer) within the matter of The State of Texas, et al. v. Google, Case Number: 4:20-cv-00957-SDJ, including the Fourth Amended Complaint.

### C.2. Discovery responses

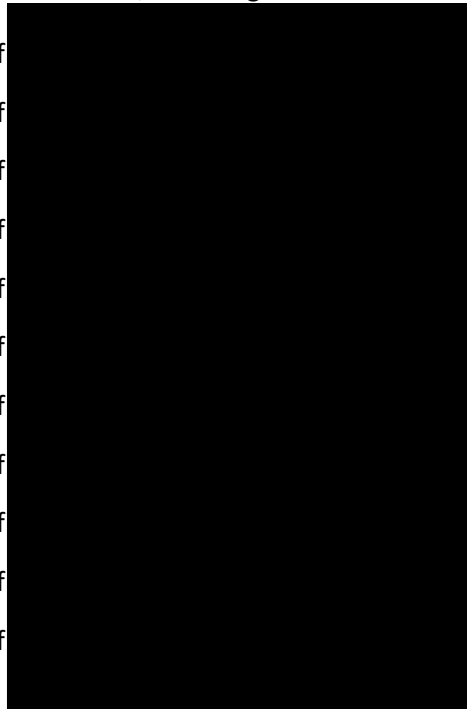
All available discovery responses produced within the matter of The State of Texas, et al. v. Google, Case Number: 4:20-cv-00957-SDJ, including:

- The Parties' amended initial disclosures;
- The Parties' discovery responses and objections to Interrogatories, Requests for Admission, and Requests for Production; and
- Google's written responses to Plaintiffs' Rule 30(b)(6) Notice.

### C.3. Deposition transcripts & exhibits

All available deposition transcripts and exhibits within the matter of The State of Texas, et al. v. Google, Case Number: 4:20-cv-00957-SDJ, including:

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1. The first step in the process of identifying a problem is to recognize that a problem exists. This is often done by comparing current performance with a desired state or goal. For example, a manager might notice that sales are declining or that customer satisfaction is low. Once a problem is identified, the next step is to define it more precisely. This involves determining the scope of the problem, its causes, and its effects. For instance, a manager might define a problem as "a 10% decline in sales over the last quarter, primarily due to a loss of market share in the competitive market." This definition helps to focus the problem and provides a clear starting point for further investigation.

2. The second step in the process is to gather information about the problem. This involves collecting data and facts that are relevant to the problem. For example, a manager might gather data on sales trends, customer feedback, and market conditions. This information is then used to identify the causes of the problem. For instance, a manager might discover that the decline in sales is due to a combination of factors, including increased competition, changes in customer preferences, and a lack of effective marketing strategies. This step is crucial because it provides the manager with the information needed to make informed decisions about how to address the problem.

3. The third step in the process is to analyze the information gathered in the previous step. This involves identifying the key factors that are contributing to the problem and determining their relative importance. For example, a manager might analyze the data and find that the primary cause of the sales decline is a loss of market share to a new competitor. This analysis helps to narrow down the problem and identify the most critical areas for intervention. For instance, a manager might decide to focus on developing new marketing strategies to compete more effectively in the market.

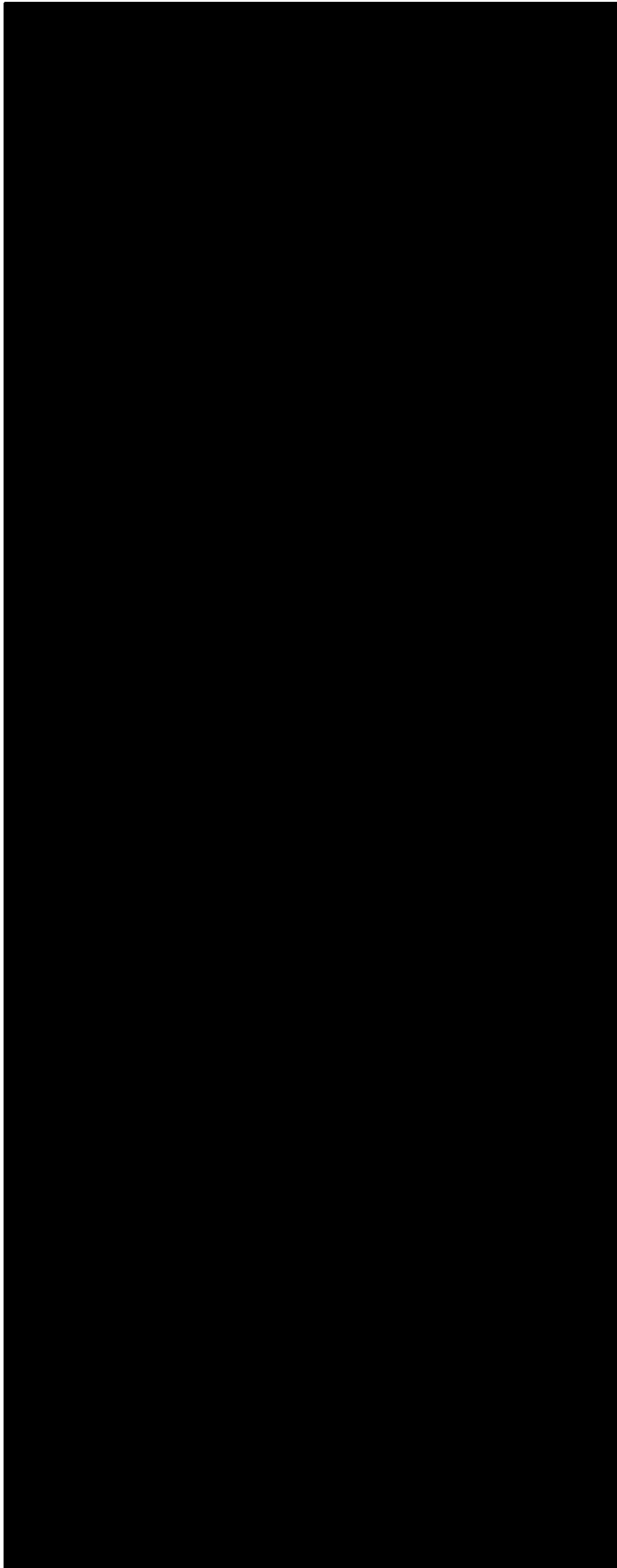
4. The fourth step in the process is to develop a plan of action to address the problem. This involves identifying specific steps that can be taken to solve the problem. For example, a manager might develop a plan that includes implementing new marketing strategies, improving customer service, and monitoring sales trends closely. This plan is then used to guide the implementation of the solution. For instance, a manager might assign specific tasks to different team members and set a timeline for completing the plan. This step is essential because it provides a clear roadmap for addressing the problem and ensures that all relevant parties are working towards the same goal.

5. The fifth and final step in the process is to implement the plan of action and monitor the results. This involves putting the plan into practice and tracking progress to ensure that the problem is being solved. For example, a manager might implement the marketing strategies and monitor sales trends to see if there is an improvement. If the results are not as expected, the manager might need to adjust the plan or take additional steps to address the problem. This step is critical because it ensures that the solution is being implemented effectively and that the problem is being resolved.

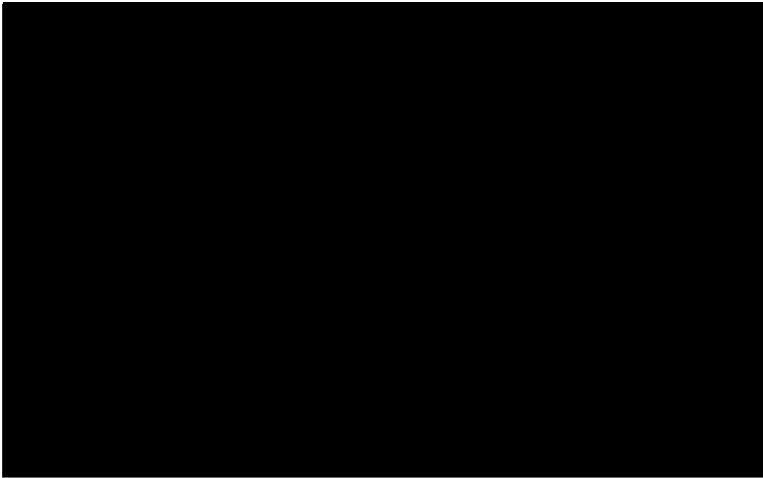
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the 1990s, the number of people in the United States who are 65 years of age and older has increased by 50 percent, and the number of people 75 years of age and older has increased by 100 percent. The number of people 85 years of age and older has increased by 200 percent. The number of people 95 years of age and older has increased by 400 percent. The number of people 100 years of age and older has increased by 1,000 percent. The number of people 105 years of age and older has increased by 2,000 percent. The number of people 110 years of age and older has increased by 4,000 percent. The number of people 115 years of age and older has increased by 8,000 percent. The number of people 120 years of age and older has increased by 16,000 percent. The number of people 125 years of age and older has increased by 32,000 percent. The number of people 130 years of age and older has increased by 64,000 percent. The number of people 135 years of age and older has increased by 128,000 percent. 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The number of people 250 years of age and older has increased by 1,073,741,824,000 percent. The number of people 255 years of age and older has increased by 2,147,483,648,000 percent. The number of people 260 years of age and older has increased by 4,294,967,296,000 percent. The number of people 265 years of age and older has increased by 8,589,934,592,000 percent. The number of people 270 years of age and older has increased by 17,179,869,184,000 percent. The number of people 275 years of age and older has increased by 34,359,738,368,000 percent. The number of people 280 years of age and older has increased by 68,719,476,736,000 percent. The number of people 285 years of age and older has increased by 137,438,953,472,000 percent. The number of people 290 years of age and older has increased by 274,877,906,944,000 percent. The number of people 295 years of age and older has increased by 549,755,813,888,000 percent. The number of people 300 years of age and older has increased by 1,099,511,627,776,000 percent. The number of people 305 years of age and older has increased by 2,199,023,255,552,000 percent. The number of people 310 years of age and older has increased by 4,398,046,511,104,000 percent. The number of people 315 years of age and older has increased by 8,796,093,022,208,000 percent. The number of people 320 years of age and older has increased by 17,592,186,044,416,000 percent. The number of people 325 years of age and older has increased by 35,184,372,088,832,000 percent. The number of people 330 years of age and older has increased by 70,368,744,177,664,000 percent. The number of people 335 years of age and older has increased by 140,737,488,355,328,000 percent. The number of people 340 years of age and older has increased by 281,474,976,710,656,000 percent. The number of people 345 years of age and older has increased by 562,949,953,421,312,000 percent. The number of people 350 years of age and older has increased by 1,125,899,906,842,624,000 percent. The number of people 355 years of age and older has increased by 2,251,799,813,685,248,000 percent. The number of people 360 years of age and older has increased by 4,503,599,627,370,496,000 percent. The number of people 365 years of age and older has increased by 9,007,199,254,740,992,000 percent. The number of people 370 years of age and older has increased by 18,014,398,509,481,984,000 percent. The number of people 375 years of age and older has increased by 36,028,797,018,963,968,000 percent. The number of people 380 years of age and older has increased by 72,057,594,037,927,936,000 percent. The number of people 385 years of age and older has increased by 144,115,188,075,855,872,000 percent. The number of people 390 years of age and older has increased by 288,230,376,151,711,744,000 percent. The number of people 395 years of age and older has increased by 576,460,752,303,423,488,000 percent. The number of people 400 years of age and older has increased by 1,152,921,504,606,846,976,000 percent. The number of people 405 years of age and older has increased by 2,305,843,009,213,693,952,000 percent. The number of people 410 years of age and older has increased by 4,611,686,018,427,387,904,000 percent. The number of people 415 years of age and older has increased by 9,223,372,036,854,775,808,000 percent. The number of people 420 years of age and older has increased by 18,446,744,073,709,551,616,000 percent. The number of people 425 years of age and older has increased by 36,893,488,147,419,103,232,000 percent. The number of people 430 years of age and older has increased by 73,786,976,294,838,206,464,000 percent. The number of people 435 years of age and older has increased by 147,573,952,589,676,412,928,000 percent. The number of people 440 years of age and older has increased by 295,147,905,179,352,825,856,000 percent. The number of people 445 years of age and older has increased by 590,295,810,358,705,651,712,000 percent. The number of people 450 years of age and older has increased by 1,180,591,620,717,411,303,424,000 percent. The number of people 455 years of age and older has increased by 2,361,183,241,434,822,606,848,000 percent. The number of people 460 years of age and older has increased by 4,722,366,482,869,645,213,696,000 percent. The number of people 465 years of age and older has increased by 9,444,732,965,739,290,427,392,000 percent. The number of people 470 years of age and older has increased by 18,889,465,931,478,580,854,784,000 percent. The number of people 475 years of age and older has increased by 37,778,931,862,957,161,709,568,000 percent. The number of people 480 years of age and older has increased by 75,557,863,725,914,323,419,136,000 percent. The number of people 485 years of age and older has increased by 151,115,727,451,828,646,838,272,000 percent. The number of people 490 years of age and older has increased by 302,231,454,903,657,293,676,544,000 percent. The number of people 495 years of age and older has increased by 604,462,909,807,314,587,353,088,000 percent. The number of people 500 years of age and older has increased by 1,208,925,819,614,629,174,706,176,000 percent. The number of people 505 years of age and older has increased by 2,417,851,639,229,258,349,412,352,000 percent. The number of people 510 years of age and older has increased by 4,835,703,278,458,516,698,824,704,000 percent. The number of people 515 years of age and older has increased by 9,671,406,556,917,033,397,649,408,000 percent. The number of people 520 years of age and older has increased by 19,342,813,113,834,066,795,298,816,000 percent. The number of people 525 years of age and older has increased by 38,685,626,227,668,133,590,597,632,000 percent. The number of people 530 years of age and older has increased by 77,371,252,455,336,267,181,195,264,000 percent. The number of people 535 years of age and older has increased by 154,742,504,910,672,534,362,390,528,000 percent. The number of people 540 years of age and older has increased by 309,485,009,821,345,068,724,781,056,000 percent. The number of people 545 years of age and older has increased by 618,970,019,642,690,137,449,562,112,000 percent. The number of people 550 years of age and older has increased by 1,237,940,039,285,380,274,899,124,224,000 percent. The number of people 555 years of age and older has increased by 2,475,880,078,570,760,549,798,248,448,000 percent. The number of people 560 years of age and older has increased by 4,951,760,157,141,521,099,596,496,896,000 percent. The number of people 565 years of age and older has increased by 9,903,520,314,283,042,199,193,993,792,000 percent. The number of people 570 years of age and older has increased by 19,807,040,628,566,084,398,387,

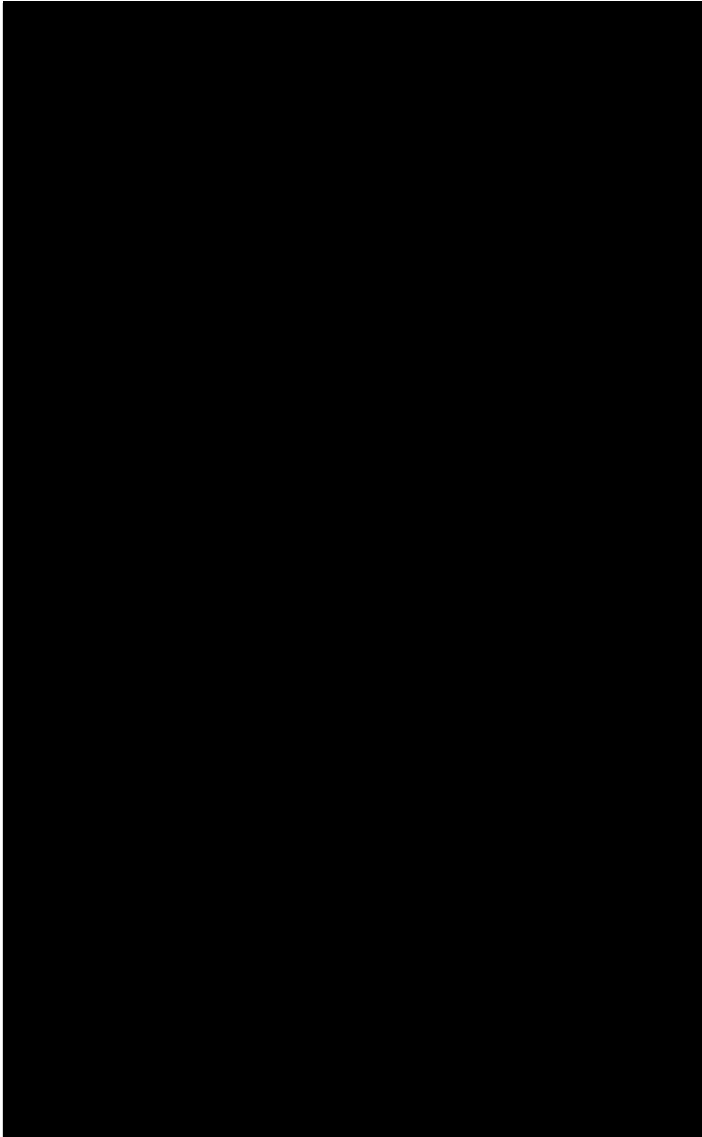
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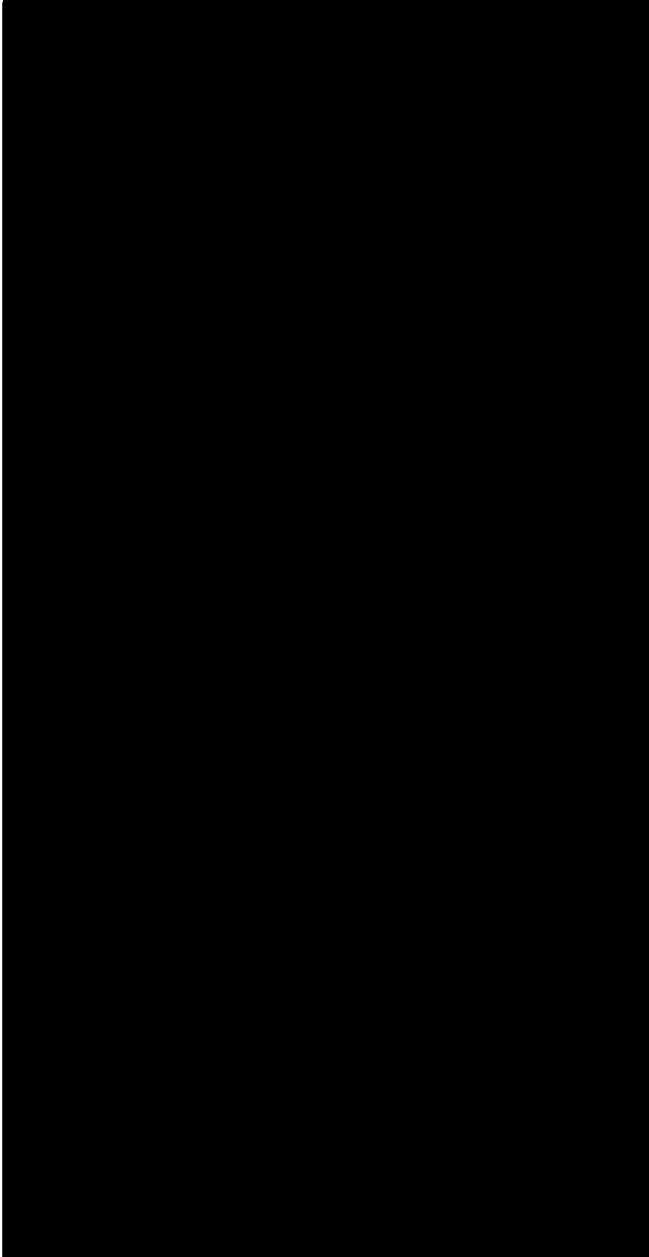


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Other available deposition transcripts and exhibits, including the depositions and exhibits of:





#### **C.4. Expert reports & declarations**

All available expert reports, including appendices, backup materials, and cited materials, within the matter of The State of Texas, et al. v. Google, Case Number: 4:20-cv-00957-SDJ, including:

- 2024.06.07 Expert Report of Jeffrey S. Andrien
- 2024.06.07 Expert Report of Joshua Gans, as well as 2024.07.24 Errata and Supplemental Appendix D
- 2024.06.07 Expert Report of Jacob Hostetler



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- 2024.06.07 Expert Report of John Chandler
- 2024.06.07 Expert Report of Matthew Weinberg
- 2024.06.07 Expert Report of Parag Pathak
- 2024.07.30 Expert Report of Anindya Ghose
- 2024.07.30 Expert Report of Donna L. Hoffman
- 2024.07.30 Expert Report of Douglas Skinner
- 2024.07.30 Expert Report of Itamar Simonson
- 2024.07.30 Expert Report of Martin C. Rinard
- 2024.07.30 Expert Report of Paul R. Milgrom
- 2024.07.30 Expert Report of Steven N. Wiggins
- 2024.08.06 Expert Report of Michael R. Baye
- 2024.08.06 Expert Report of Jason Nieh

All available expert reports (with redactions) within the matter of USA v. Google, Case Number: 1:23-cv-00108-LMB-JFA, including:

- Declarations of Google Employees
- 2023.12.22 Expert Report of Gabriel Weintraub, GOOG-AT-MDL-C-000018734
- 2023.12.22 Expert Report of R. Ravi, GOOG-AT-MDL-C-000019017
- 2023.12.22 Expert Report of Robin S. Lee, GOOG-AT-MDL-C-000019273
- 2023.12.22 Expert Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000019786
- 2023.12.22 Expert Report of Thomas S. Respass, GOOG-AT-MDL-C-000020106
- 2023.12.22 Expert Report of Timothy Simcoe, GOOG-AT-MDL-C-000020274
- 2024.01.13 Errata to Abrantes-Metz Expert Report, GOOG-AT-MDL-C-000020435
- 2024.01.13 Errata to Ravi Expert Report, GOOG-AT-MDL-C-000020437
- 2024.01.13 Errata to Respass Expert Report, GOOG-AT-MDL-C-000020440
- 2024.01.13 Errata to Simcoe Expert Report, GOOG-AT-MDL-C-000020467
- 2024.01.13 Errata to Weintraub Expert Report, GOOG-AT-MDL-C-000020471
- 2024.01.23 Chevalier Expert Report, GOOG-AT-MDL-C-000020474

- 2024.01.23 Ferrante Expert Report, GOOG-AT-MDL-C-000020714
- 2024.01.23 Ghose Expert Report, GOOG-AT-MDL-C-000020767
- 2024.01.23 Israel Expert Report, GOOG-AT-MDL-C-000021036
- 2024.01.23 Milgrom Expert Report, GOOG-AT-MDL-C-000021794
- 2024.01.23 Rinard Expert Report, GOOG-AT-MDL-C-000022191
- 2024.01.23 Shirky Expert Report, GOOG-AT-MDL-C-000022229
- 2024.01.23 Simonson Expert Report, GOOG-AT-MDL-C-000022290
- 2024.01.23 Skinner Expert Report, GOOG-AT-MDL-C-000022948
- 2024.02.13 Expert Rebuttal Report of Adoria Lim, GOOG-AT-MDL-C-000023002
- 2024.02.13 Expert Rebuttal Report of Gabriel Weintraub, GOOG-AT-MDL-C-000023226
- 2024.02.13 Expert Rebuttal Report of Kenneth Wilbur, GOOG-AT-MDL-C-000023322
- 2024.02.13 Expert Rebuttal Report of R. Ravi, GOOG-AT-MDL-C-000023435
- 2024.02.13 Expert Rebuttal Report of Robin S. Lee, GOOG-AT-MDL-C-000023516
- 2024.02.13 Expert Rebuttal Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000023887
- 2024.02.13 Expert Rebuttal Report of Timothy Simcoe, GOOG-AT-MDL-C-000024064
- 2024.02.13 Expert Rebuttal Report of Wayne Hoyer, GOOG-AT-MDL-C-000024138
- 2024.02.13 Expert Rebuttal Report of Wenke Lee, GOOG-AT-MDL-C-000024270
- 2024.02.16 Errata to Ravi Rebuttal Report, GOOG-AT-MDL-C-000024387
- 2024.02.20 Errata to Simcoe Rebuttal Report, GOOG-AT-MDL-C-000024389
- 2024.02.23 Errata to Weintraub Rebuttal Report, GOOG-AT-MDL-C-000024390
- 2024.02.23 Supplemental Errata to Weintraub Expert Report, GOOG-AT-MDL-C-000024391
- 2024.02.24 Errata to Wilbur Rebuttal Report, GOOG-AT-MDL-C-000024392
- 2024.02.26 Errata to Hoyer Rebuttal Report, GOOG-AT-MDL-C-000024397
- 2024.02.28 Errata to Abrantes-Metz Rebuttal Report, GOOG-AT-MDL-C-000024399
- 2024.03.04 Expert Supplemental Report of Robin S. Lee, GOOG-AT-MDL-C-000024403
- 2024.03.08 Consolidated Errata to Lee Rebuttal Report, GOOG-AT-MDL-C-000024436
- 2024.01.13 Expert Report of Weintraub Errata, GOOG-AT-MDL-C-000040965
- 2024.01.13 Expert Report of Simcoe Errata, GOOG-AT-MDL-C-000040961

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- 2024.01.13 Expert Report of Respress Errata\_with Figure Errata\_Redacted, GOOG-AT-MDL-C-000040934
- 2024.01.13 Expert Report of R Ravi Errata, GOOG-AT-MDL-C-000040931
- 2024.01.13 Expert Report of Abrantes-Metz Errata, GOOG-AT-MDL-C-000040929
- 2024.03.08 Consolidated Errata to Lee Rebuttal Report, GOOG-AT-MDL-C-000040926
- 2024.03.04 Expert Supplemental Report of Robin S. Lee, PhD, GOOG-AT-MDL-C-000040893
- 2024.02.28 Rebuttal Report Errata of Rosa Abrantes-Metz Signed, GOOG-AT-MDL-C-000040889
- 2024.02.25 Expert Rebuttal Report of Hoyer Errata, GOOG-AT-MDL-C-000040887
- 2024.02.24 Wilbur Rebuttal Errata, GOOG-AT-MDL-C-000040882
- 2024.02.23 Weintraub Rebuttal Report Errata, GOOG-AT-MDL-C-000040881
- 2024.02.23 Expert Report of Weintraub Supplemental Errata, GOOG-AT-MDL-C-000040880
- 2024.02.20 Errata to Simcoe Rebuttal Report, GOOG-AT-MDL-C-000040879
- 2024.02.16 Errata to Ravi Rebuttal Report (Highly Confidential), GOOG-AT-MDL-C-000040877
- 2024.02.13 Rebuttal Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000040700
- 2024.02.13 Expert Report of Wenke Lee, GOOG-AT-MDL-C-000040583
- 2024.02.13 Expert Rebuttal Report of Wayne Hoyer, GOOG-AT-MDL-C-000040451
- 2024.02.13 Expert Rebuttal Report of Timothy Simcoe\_Redacted, GOOG-AT-MDL-C-000040377
- 2024.02.13 Expert Rebuttal Report of Robin S. Lee\_Redacted, GOOG-AT-MDL-C-000040006
- 2024.02.13 Expert Rebuttal Report of R Ravi, GOOG-AT-MDL-C-000039925
- 2024.02.13 Expert Rebuttal Report of Kenneth Wilbur\_Redacted, GOOG-AT-MDL-C-000039812
- 2024.02.13 Expert Rebuttal Report of Gabriel Weintraub\_Redacted, GOOG-AT-MDL-C-000039716
- 2024.02.13 Expert Rebuttal Report of Adoria Lim\_Redacted, GOOG-AT-MDL-C-000039492
- 2024.01.23 Expert Report of William Clay Shirky, GOOG-AT-MDL-C-000039431
- 2024.01.23 Expert Report of Paul R. Milgrom, GOOG-AT-MDL-C-000039034
- 2024.01.23 Expert Report of Martin C. Rinard, GOOG-AT-MDL-C-000038996
- 2024.01.23 Expert Report of Mark A. Israel\_Redacted, GOOG-AT-MDL-C-000038238
- 2024.01.23 Expert Report of Judith A. Chevalier\_Redacted, GOOG-AT-MDL-C-000037998
- 2024.01.23 Expert Report of Itamar Simonson, GOOG-AT-MDL-C-000037340
- 2024.01.23 Expert Report of Douglas Skinner, GOOG-AT-MDL-C-000037286

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- 2024.01.23 Expert Report of Anthony J. Ferrante, GOOG-AT-MDL-C-000037233
- 2024.01.23 Expert Report of Anindya Ghose\_Redacted, GOOG-AT-MDL-C-000036954
- 2023.12.22 Expert Report of Timothy Simcoe\_Redacted, GOOG-AT-MDL-C-000036793
- 2023.12.22 Expert Report of Thomas Respress\_Redacted, GOOG-AT-MDL-C-000036625
- 2023.12.22 Expert Report of Rosa Abrantes-Metz\_Redacted, GOOG-AT-MDL-C-000036305
- 2023.12.22 Expert Report of Robin S. Lee, PhD\_Redacted, GOOG-AT-MDL-C-000035792
- 2023.12.22 Expert Report of R Ravi\_Redacted, GOOG-AT-MDL-C-000035536
- 2023.12.22 Expert Report of Gabriel Weintraub\_Redacted, GOOG-AT-MDL-C-000035253

### **C.5. Bates stamped productions, including access to Plaintiffs' entire production database, as well as the following documents and Google and third-party productions made since June 7, 2024**

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| ■ FBTEX_00079937                    | ■ FBTEX_00892345                  |
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| ■ FBTEX_00277880                    | ■ FBTEX_01003026                  |
| ■ FBDOJGOOG_00327692                | ■ FBTEX_01021169                  |
| ■ FBTEX_00327637 / FBTEX_00327634   | ■ FBTEX_01062704                  |
| ■ FBTEX_00327690                    | ■ FBTEX_01064247                  |
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| ■ FBTEX_00482531                    | ■ FBTEX_01080688                  |
| ■ FBTEX_00528526                    | ■ FBTEX_01082050                  |
| ■ FBTEX_00540345                    | ■ FBTEX_01089475                  |

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■ GOOG-AT-MDL-B-002500395	■ GOOG-AT-MDL-B-005282318

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■ GOOG-AT-MDL-B-005372599	■ GOOG-DOJ-14365517
■ GOOG-AT-MDL-B-005457387	■ GOOG-DOJ-14433486
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■ GOOG-AT-MDL-B-006316352	■ GOOG-DOJ-14435110
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■ GOOG-AT-MDL-B-006365981	■ GOOG-DOJ-14453674
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■ GOOG-AT-MDL-B-007212533	■ GOOG-DOJ-14494204
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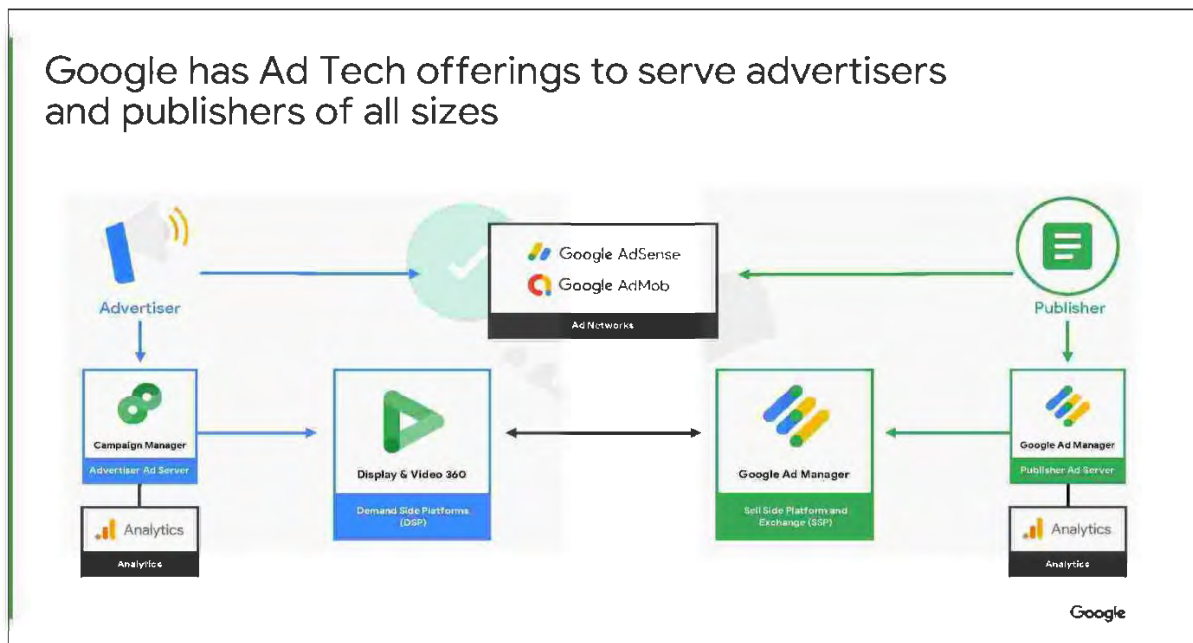
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## Appendix D. Ad Tech industry figures

- (171) The figure below, Figure 33, provides another visualization of how the six DVAA products (AdMob, AdSense, AdX, CM360, DFP, and DV360) interact amongst themselves. It also shows how networks, like GDN, and exchanges, like AdX, perform similar functions, connecting advertisers with publishers. The figure, which is from an internal Google presentation in 2020, refers to AdX and DFP as Google Ad Manager.

Figure 33: Google Ad Tech products

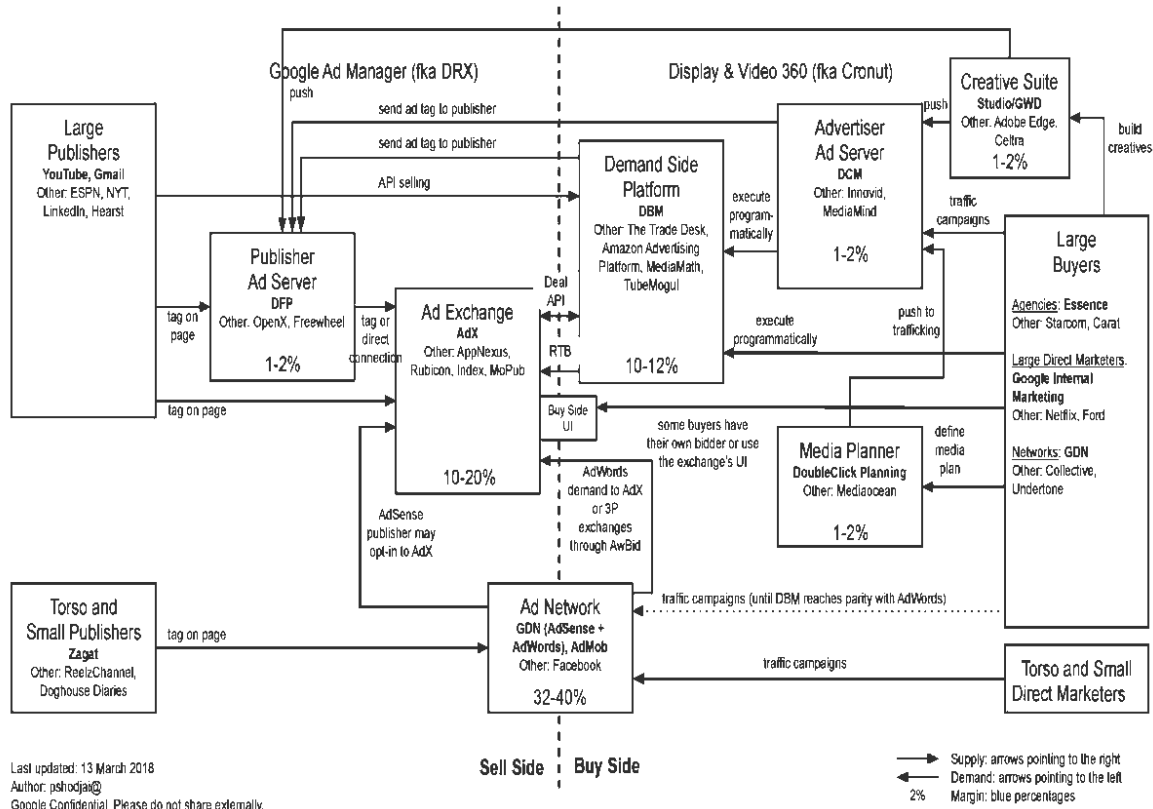


Source: GOOG-DOJ-AT-01510462.

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- (172) The figure below, which comes from an internal Google document, broadens the scope of Ad Tech products beyond DVAA to the entire market, including non-Google products and services. Each box in the figure represents an Ad Tech product type or actor in the industry, with Google's products and services listed in bold. This figure, from 2018, uses some outdated names for Google products, which are described in the figure notes.

**Figure 34: Google's 2018 visualization of various Ad Tech components**



Source: GOOG-NE-04597999.

Notes: The names of several Google products have changed since this figure was made in 2018. For example, Google DBM is now known as DV360, and AdWords is now known as Google Ads.

## Appendix E. Alphabet penalty allocation by year

Figure 35: Alphabet Inc. penalties by year (nominal allocation)

Year	Alphabet Inc. Total Revenue	\$50 billion (payment plan 2013-2023)	\$50 billion (lump sum 2023)
2013	\$7,605	\$227	
2014	\$66,001	\$1,966	
2015	\$74,989	\$2,233	
2016	\$90,272	\$2,689	
2017	\$110,855	\$3,302	
2018	\$136,819	\$4,075	
2019	\$161,857	\$4,821	
2020	\$182,527	\$5,436	
2021	\$257,637	\$7,673	
2022	\$282,836	\$8,424	
2023	\$307,394	\$9,155	\$50,000
<b>Total</b>	<b>\$1,678,792</b>	<b>\$50,000</b>	<b>\$50,000</b>

Source: CapIQ; Andrien Report, Exhibit 2, Note 8.

Note: Alphabet Inc. revenues in 2013 are multiplied by the portion of the year during which the alleged deceptive trade practices occurred (November 11 – December 31)